

Species Identification of Commercial Crocodilian Skins

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(Figures 1-41)

Gross similarities in the morphology of crocodilian skins has made specific identification of individual commercial hides extremely difficult. Qualitative and quantitative differences between the hides of various species are defined and form the basis of a key to commercial crocodilian hides. The distribution, common, and commercial names, distinguishing characteristics of the hides, and the status of the wild populations of each of the 27 species and subspecies is given.

INTRODUCTION

TO THE LAYMAN most crocodilians look similar — all have relatively long toothy snouts, scaly backs, flattened oar-like tails, large webbed hindfeet, and most have crossbanded color patterns. As a consequence, most Americans mentally lump all crocodilians under the collective heading “alligator.” Profound differences exist between the species of crocodilians, but the untrained eye notices the gross similarities rather than the less obvious differences. When it comes to identifying a species of crocodilian from a commercial hide, however, even a trained herpetologist faces serious difficulty. All commercial skins are grossly alike. All crocodilian leather is retailed throughout the United States as “alligator,” while in Europe, Africa, and Asia the same hides are sold as “crocodile.”

In this paper, we attempt to provide means to identify commercial crocodilian hides. Since the paper will be read by layman, trained herpetologist, government inspector, and commercial dealer alike, we have endeavored to use terminology comprehensible to all. Where there is a chance of confusion, we have provided photographs and line drawings for clarification.

MATERIALS AND METHODS

Comparisons were made between the skins of live specimens in zoos and private collections, preserved specimens and dried skins in museum collections, and tanned and finished

commercial skins supplied by the Reptile Products Association of the United States. A total of over 350 specimens were examined. Museum specimens of every species and subspecies were studied. Living specimens of every form, except *Caiman crocodilus apaporiensis* and *Crocodylus siamensis*, were seen. Commercial hides of most species were examined. The notable exceptions were *Gavialis gangeticus*, *Alligator sinensis*, *Paleosuchus palpebrosus*, *Paleosuchus trigonatus*, *Crocodylus palustris*, and *Crocodylus rhombifer*. The raw data are on deposit at the New York Zoological Park. The characters and terms used in this study are defined below.

COMMERCIAL HIDES. Hides used in the crocodilian hide trade for the manufacture of leather goods are termed commercial hides, whether they are raw skins or are in the process of being tanned and finished.

HORNBACK HIDES. Rough dorsal (back) skins obtained by skinning the animals beginning from an incision made along the midventral (belly) line. Large bony dorsal scales, usually with raised keels, occupy the center of the hide. Smooth squarish scales from the ventral surface are located along the lateral edges of the hide. Hornback hides usually are skinned from relatively small specimens since the heavily ossified dorsal scales of adults make their hides stiff and limits its use for leather. Skin from the tail and proximal portion of the legs is attached to the hide (figure 1).

BELLY HIDES. Smooth ventral (belly) skins obtained by skinning the animal beginning at an incision just below the large bony dorsal scales high on one side and continuing down the side, under the body, and up the other side to the

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edge of the large dorsal scales on that side of the back. The scales of belly skins are squarish or rectangular in shape over most of the center of the skin. The round or oval scales from the side of the body are located along the lateral edges of the hide. The vent is represented by a hole along the midline of the skin. Skin from the tail and proximal portion of the legs is attached (figure 1).

BUTTON-BELLY AND SOFT-BELLY HIDES. Belly skins that possess osteoderms, or buttons (the commercial name), are called button hides. Belly skins that lack osteoderms are called soft-belly hides. Button-belly hides will not flex through the middle of a scale because of the osteoderm button. Soft-belly hides not only flex between scales but also bend to a lesser degree through the middle of scales (figure 2). As a result the most sought after hides are soft-bellies. Button-bellies with large osteoderms are most frequently used for making the flat, non-flexing sides of purses or attaché cases. The stiffness of these skins limits their use where flexibility is demanded, as in shoes, belts, and watch-bands.

SIDES. A narrow strip of soft skin taken from a point under the lower jaw and extending back over the front leg, along the side of the trunk, under the rear leg and ending near the vent (figure 15). Such strips are skinned from large caimans (*Caiman*, *Melanosuchus*, *Paleosuchus*) which have such heavy osteoderm buttons in the belly skin, as to make this skin almost worthless as leather. The hide-hunters avoid both the bony dorsal scales and the bony belly scales by removing only the soft side skin. The scales on sides consist of large, round to diamond-shaped scales separated by soft skin or small scales. The largest scales usually possess osteoderm buttons and may have a low keel.

Sides could, of course, be cut from soft-bellied alligators and crocodiles, as well as button-bellied caimans. The reason they are not is that soft-belly hides are worth more with the sides attached than they are with the strips removed. The best tanned soft-belly hides sell for as much as \$12.00 per square foot. Tanned sides sell for only \$5.00 to \$15.00 apiece.

THROATS, SIDES, AND GIRDLES. Throats are V-shaped pieces skinned from under the chin and the sides of the neck. Girdles are taken from the thighs and belly immediately anterior to the vent. Sides, which accompany throats and girdles, are stripped from the sides of the trunk between the legs (figure 20). These cuts of skin are from exceptionally large caimans (*Melanosuchus*, and possibly *Caiman*)

which have heavy bony belly osteoderms. The large size of the scales on these pieces attests to the size of the animals they come from.

FLIPPERS. The small, irregular-shaped pieces of skin from the legs. The scales are usually uniformly small, smooth, and squarish.

RAW HIDES OR SALTED HIDES. Untanned commercial hides. They may be dry or moist from the salt. They usually are rolled up for shipment, and retain the color pattern of the live specimen — most frequently dark spots or dark crossbands on the side of the trunk and tail.

CRUSTS. Hides which have been tanned, but not dyed or polished. Crusts are usually ash gray or tan, and have a dull, unpolished finish (figures 9, 10, and 15). The next step in the finishing process is to bleach or dye the hide its final color. If it is a button-belly, the osteoderms are shaved from the inside of the hide to eliminate as much of them as possible. It is not possible to remove every osteoderm button in its entirety, but it is possible to remove enough of them to make a stiff hide much more flexible (figures 14 and 19). Unskilled tanners may shave the hide too closely and leave thin, weak sections between the rows of scales.

POLISHED AND FINISHED HIDES. After dyeing, skins customarily are given a high-gloss finish by burnishing the scales under the pressure of a polishing wheel. The glossy finish is characteristic of most crocodilian products. After the hide has been finished, it is ready for cutting into the pieces that are to be made into the manufactured product.

FLAT FINISH AND BOMBE FINISH. Finished skins with flat, level scales are flat finished skins. Those in which the individual scales are slightly curved, with the center of each one arching up from the crease where it meets adjacent scales, are given the French name *bombe*.

SAUVAGE FINISH. Not all finished hides have a highly polished surface. Some are finished with a process that retains much of the texture of the original crust. The result is a textured, non-glossy, oiled-leather appearance called *sauvage* (figure 9).

VENTRAL SCALES AND LATERAL SCALES. Scales from the underside of the throat, body, and tail are ventral scales (figure 1). They are large and squarish in all crocodilians. The individual square scales are in contact with adjacent scales and are arranged in rows across the belly of the animal. Scales from the side of the body are lateral scales (figure 1).

They frequently are arrayed in two distinct size classes, the larger composed of oval and diamond-shaped scales. These individual scales usually are not in contact with adjacent scales.

Ventral and lateral scales possess a number of characteristics which may be used to identify a particular species or group of species. Most commercial skins used in the United States are either belly skins or sides, and since even hornback hides normally retain ventral scales along their edges, only the ventral and lateral scales are considered in this paper.

BUTTONS. The bony osteoderms present in the scales of many crocodilians. The presence of buttons in the ventral scales of belly skins gives them their commercial name, button-belly hides. Buttons can be seen if the hide is turned over and the backside (inside) examined. Even though they are decalcified during tanning, the osteoderm buttons are a different color. In crusts and light-colored finished skins, buttons are usually slightly darker than the rest of the skin (figures 13 and 14). In dark finished skins, they may be lighter than the surrounding tissue, although they are usually darker (figures 19, 34, 35, 36, and 37).

In many cases buttons also can be detected from the front side (outside) of a finished skin as ill-defined light-colored blotches in the center of the ventral scales (figures 18 and 34). They may also be evident as raised or slightly sunken areas on the surface of the ventral scales. They can best be seen by holding the polished surface of the scale in a position where light reflected off its surface reaches your eye. In this position any surface irregularity becomes apparent (figures 35 and 41).

SURFACE PITTING. During the tanning process, the bony osteoderms do not shrink as much as the non-calcified tissue. As a result, button skins may exhibit some of the pock-marked or wrinkled texture of the underlying osteoderms. This condition is called surface pitting. Surface pitting is best seen where the osteoderms are most heavy, as in the dorsal scales of hornback hides, and the ventral scales of the skins of caiman (*Caiman*, *Melanosuchus*, *Paleosuchus*), slender-snouted crocodile (*Crocodylus cataphractus*), dwarf crocodile (*Osteoleaemus*), or button-belly Nile crocodile (*Crocodylus niloticus*) (figures 10, 11, 12, 18, 36, and 37).

The skins of some species are more strongly pitted than others; adult specimens tend to be more pitted than juveniles; and not all individuals exhibit the same degree of pitting throughout all their scales.

SINGLE BUTTONS AND DOUBLE BUTTONS. Those crocodile and alligator specimens which have osteoderms are characterized by having single buttons, one osteoderm button per scale (figures 8, 34, 36, and 37), while all caimans have double buttons, two osteoderms per scale (figures 13, 14, and 19). In caimans, the posterior of the two buttons occupies almost the entire area of the scale. The anterior button occupies the anterior one-quarter of the scale and curves upward and inward (mesially) to protectively overlap the posterior margin of the next anterior scale and the intervening soft skin. The overlapping of osteoderms is an evolutionary adaptation that affords more protection to the weak hinge point between the scales, although it causes the loss of some freedom of movement. The dwarf caimans (*Paleosuchus*), with proportionally the largest double buttons of any species of crocodilian, are well on the way to evolving the stiff analog of a turtle plastron. The two parts of the caiman double button are more evident before the buttons are shaved during finishing (figure 14). During shaving, the anterior, inward-curving button is nearly completely removed. In most cases, however, part of the anterior button remains even after the shaving is complete (figure 19).

FOLLICLE GLAND. Belly scales of gavials and all crocodiles have a pit-like structure, the follicle gland, near the posterior margin (figures 22 and 24). The glands are clearly visible in live specimens, raw skins, and crusts. In finished skins dyed dark, the follicle glands may be lighter in color (figure 25). The glands may be partly obscured during the polishing process. If this happens, the gland usually can be seen as a short deep wrinkle running from the gland to the posterior edge of the scale (figure 35). In finished skins, follicle glands are detected most easily on the throat and in the area just anterior to the vent as well as on the underside of the tail (figures 28 and 30).

SPIDER-WEB UMBILICUS. Alligator hides have neither surface pitting nor follicle glands. The ventral scales of finished alligator skins are glossy smooth without ornamentation. It is also possible to distinguish the belly skin of the American alligator (*Alligator mississippiensis*) from all other species on the basis of the shape of the umbilicus scar. Crocodilians with buttons in the ventral scales tend to lose all evidence of the umbilicus once it is healed and the osteoderms are formed. Other species may retain the posterior one-third of the scar as a zigzag arrangement of small scales scattered along the midline just anterior to the vent. In the American alligator, and no other species, this same

posterior portion of the scar remains as an area of soft skin lacking scales, and because of the profusion of creases and lines it has a distinctly spider-web appearance (figure 7).

VENTRAL COLLAR. Most crocodylians have a prominent row of enlarged scales, called a ventral collar, across the throat just anterior to the front legs (figure 1). A few species lack an enlarged row of scales, so the collar is not conspicuous. One species has a double collar, two enlarged rows of scales.

TRANSVERSE VENTRAL SCALE ROWS. Ventral scales are arranged in transverse rows in all crocodylians, but the number of rows found between the neck and vent differs between species. The transverse rows of ventral scales are counted from the first row posterior to the ventral collar to, but not including, the row of scales encircling the vent (figure 1). The row of scales around the vent may be missing from a commercial hide because the hide-hunter was careless when skinning the animal. In that event the position of the missing rows must be estimated. Only rows which cross the midline are counted. Incomplete or missing rows will add confusing variation to the count, so to eliminate doubt, the count first should be made only to the right of the midline and then repeated on the left side, and the two counts compared.

LARGE-SCALE AND SMALL-SCALE HIDES. Soft-belly crocodylians which have 26 to 35 transverse ventral scale rows are called small-scale hides by the hide trade. Soft-belly species with 20 to 25 transverse ventral scale rows are called large-scale hides (see the key that follows and figure 26).

TAIL WHORLS. The transverse rows of scales under the tail are the ventral portions of the whorls of scales that completely encircle the tail. The ventral portion of these whorls, like the rows of ventral scales on the body, are usually complete and evenly arranged (figure 28). Morelet's crocodile (*Crocodylus moreletii*), however, possesses irregular or incomplete whorls 66 percent of the time (figure 30). No other species shows as high an incidence of irregularity in this character.

IDENTIFICATION OF CROCODYLIAN HIDES

The following keys can be used to identify the species, or species groups, of commercial belly skins, hornbacks, and sides. The keys are of limited use in identifying throats and girdles, and are useless for flippers. They may be useless in identifying skins already manufactured into finished products.

Keys are identification tools which employ a series of alternative choices. To use the keys, first decide whether or not the hide you wish to identify is a side, belly, or hornback. Once this determination has been made, proceed to the appropriate key. Each set of alternative choices, or couplets, is numbered. Starting with couplet 1, decide which of the two choices, "a" or "b," best describes the hide to be identified. The number that follows the correct choice indicates the next couplet. By moving from couplet to couplet following the numbers shown after each correct choice, you will arrive at a final choice which indicates the species, or species group, of crocodylian from which the hide was taken. Once the identification has been made, you should turn to the text that follows the keys for information on the distribution of the species, the commercial names under which it is sold, additional distinguishing characteristics, and status of the wild populations.

Species identifications supplied by manufacturers are not to be relied on until verified by means of the keys. In the past two years, the authors have seen live African slender-snouted crocodiles and South American caimans shipped into the United States from Bangkok, Thailand, as Siamese crocodiles; finished African dwarf crocodile hides enter from a tanner in France who labelled them gavia; and wallets made from South American caimans arrive from an Italian manufacturer who declared they were Nile crocodile.

A KEY TO COMMERCIAL CAIMAN SIDES

The key to sides is based on the assumption that the sides being identified are from caimans (*Caiman*, *Melanosuchus*, or *Paleosuchus*), and not from other species. At the present time, caimans are the only crocodylians being skinned in this manner. This may not be the case at some future date. In addition, small finished products such as belts may be pieced together from scrap left over from the manufacture of large belly hide products. These small pieces may come from any species, therefore, the key is of little use in identifying pieced items.

1. a) Rows of large oval scales alternating with rows of small scales (figure 21) . . . *Melanosuchus niger*.
- b) Rows of large scales alternating with network of creases and small irregular scales (figure 16) . . . 2
2. a) Large oval scales, usually smooth, and arranged in distinct rows . . . *Caiman crocodilus* (four subspecies), *Caiman latirostris*.

- b) Large oval scales usually keeled, and usually not arranged in distinct rows . . . *Paleosuchus palpebrosus*, *Paleosuchus trigonatus*.

A KEY TO CROCODILIAN BELLY SKINS AND HORNBACK SKINS

This key is for use with belly skins. Hornback hides can be identified if you limit your attention to the belly scales found along the lateral edges of the hide. Surface pitting is not evident in untanned hides.

1. a) Ventral (belly) scales with follicle glands (figures 22 and 24) . . . 2
- b) Ventral (belly) scales without follicle glands (figures 4, 11, and 18) . . . 4
2. a) Osteoderm buttons present (figures 34 through 37) . . . *Crocodylus cataphractus*, *Crocodylus niloticus*, *Osteolaemus tetraspis* (two subspecies).
- b) Osteoderm buttons not present (figure 27) . . . 3
3. a) Transverse rows of ventral scales 20 to 25 . . . *Crocodylus acutus* (south of Panama), *Crocodylus intermedius*, *Crocodylus johnsoni*, *Crocodylus novaeguineae* (two subspecies), *Tomistoma schlegelii*.
- b) Transverse rows of ventral scales 26 to 35 . . . *Crocodylus acutus* (north of Panama), *Crocodylus moreletii*, *Crocodylus niloticus*, *Crocodylus palustris* (two subspecies), *Crocodylus porosus*, *Crocodylus rhombifer*, *Crocodylus siamensis*, *Gavialis gangeticus*.
4. a) No osteoderm buttons present in midbelly (figure 6), or single buttons present (figure 8) . . . 5
- b) Double osteoderm buttons present in midbelly (figures 14 and 19) . . . 6
5. a) Umbilicus scar has spider-web appearance (figure 7); transverse rows of ventral scales 29 or more . . . *Alligator mississippiensis*.
- b) Umbilicus scar not evident or lacks spider-web appearance; transverse rows of ventral scales 28 or fewer . . . *Alligator sinensis*.
6. a) Large osteoderm buttons present medially only, not over pelvic girdle (figure 19); surface pitting slight; transverse rows of ventral scales 25 or more . . . *Melanosuchus niger*.
- b) Large osteoderm buttons in all large ventral scales, throat to pelvis (figure

13); surface pitting slight to pronounced; transverse rows of ventral scales 18 to 30 . . . 7

7. a) Surface pitting pronounced; transverse rows of ventral scales 20 to 30 . . . 8
- b) Surface pitting slight or absent; transverse rows of ventral scales 18 to 22 . . . *Paleosuchus palpebrosus*, *Paleosuchus trigonatus*.
8. a) Transverse rows of ventral scales 26 to 30; double ventral collar . . . *Caiman latirostris*.
- b) Transverse rows of ventral scales 20 to 27; single ventral collar . . . *Caiman crocodilus* (four subspecies).

In the text that follows, the species and subspecies are listed alphabetically by scientific name within each family. The systematic arrangement follows Wermuth and Mertens (1961).

Family ALLIGATORIDAE

AMERICAN ALLIGATOR

Alligator mississippiensis (Daudin)

DISTRIBUTION. Southeastern United States — the states of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, and Texas. This species does not occur outside the United States (Schmidt, 1953; U.S. Department of Interior, 1968; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It is also called the Florida and the Mississippi alligator, or gator. Hides are marketed as American, Florida, or Louisiana alligator or soft-belly.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* No follicle glands. No osteoderm buttons (large specimens from Florida have single osteoderm buttons on the throat). Transverse ventral scale rows 29 or more. Umbilicus scar prominent and with spider-web appearance. Maximum length of live specimen is 18 feet.

STATUS OF WILD POPULATIONS. Endangered (Honegger, 1968; Pan American Union, 1967; U.S. Department of Interior, 1968). Now protected by state law in every state in which it occurs; by federal prohibition on interstate traffic in illegal hides; and by local and state prohibitions on sales of live specimens, hides, and hide products.

CHINESE ALLIGATOR

Alligator sinensis Fauvel

DISTRIBUTION. The lower Yangtze River drainage of China (Pope, 1935; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. In China it is called *T'o*, *Tou Lung*, *Yow Lung*.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* No follicle glands. Usually no osteoderm buttons, but occasionally single buttons may be present in the midbelly and collar areas. Transverse ventral scale rows 28 or fewer. Umbilicus scar not evident. Maximum length of live specimen is 6½ feet.

STATUS OF WILD POPULATIONS. Probably endangered (Honegger, 1968). This species is known from a strip of territory only a few hundred miles long. A. F. Oeming of the Alberta Game Farm, Canada, recently returned from a trip to China and reported (in *litt.*) that the species is totally protected by law and the law is rigidly enforced. Dr. Cheng, of the Institute of Zoology, Academia Sinica, Peking, is studying the species.

SOUTH AMERICAN CAIMAN

Caiman crocodilus crocodilus (Linnaeus)

DISTRIBUTION. Northern South America—Colombia east of the Andes, Peru, Ecuador, Venezuela, Guyana, Surinam, French Guiana, Trinidad, and, with the exception of a few southern tributaries, the Amazon drainage of Brazil [the exceptions are listed under *Caiman crocodilus yacare*] (Carvalho, 1955; Medem, 1968; Schmidt, 1928b; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. In the United States it is frequently called spectacled caiman (and equally frequently given the old synonymous scientific name *Caiman sclerops*). In Central and South America it is called "alligator," *baba*, *babilla*, *cachirré*, *caimán*, *caimán blanco*, *caimán del Paraguay*, *cascarudo*, *cocodrillo*, *jacaré*, *jacaré de Lunetas*, *jacaretinga*, *lagarto*, *lagarto blanco*, *lagarto negro*, *ocoroche*, *tinga*, and *yacaré blanco*. Hides are frequently marketed under these names.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* No follicle glands. Full double osteoderm buttons present. Surface pitting evident. Transverse ventral scale rows 20 to 24. Single prominent ventral collar. Highest point of ventral scale slightly anterior of center (figure 39). *Sides:* Rows of large oval scales alternating with network of

small irregular scales and creases. (The network is actually soft skin folds and creases without scales.) Maximum length of live specimen is 8½ feet.

STATUS OF WILD POPULATIONS. Most wild populations are declining and some have all but disappeared due to slaughter by hide hunters and capture by live animal collectors (Pan American Union, 1967). The subspecies is considered endangered by some experts (Honegger, 1968). South American countries require that hides be tanned before export. Colombia protects specimens less than 1.2 meters in length (Medem, 1970, in *litt.*) and Peru protects those less than one meter long (Crowe, 1965).

RIO APAPORIS CAIMAN

Caiman crocodilus apaporiensis Medem

DISTRIBUTION. Colombia—known only from the Apaporis River and its tributaries between the Falls of Jirijirimo and Puerto Yaviya (Medem, 1955, 1968; Wermuth and Mertens, 1961).

OTHER COMMON NAMES. In Colombia it is called *babilla*, *cachirré*, *cocodrillo*, *jacaretinga*, *lagarto negro* and *ocoroche*. If marketed, hides would be sold under these names, or as *tinga*.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* No follicle glands. Full double osteoderm buttons present. Surface pitting evident. Transverse ventral scale rows 20 to 24. Single prominent ventral collar. Highest point of ventral scale is slightly anterior of center (figure 39). *Sides:* Rows of large oval scales alternating with network of small irregular scales and creases. Maximum length of live specimen is 7 feet.

STATUS OF WILD POPULATIONS. Critically endangered. This subspecies has the most restricted range of any crocodilian. It is known only from an area 125 miles long in one river. Hide hunters can completely decimate this form in one or two years unless hunting is prohibited immediately. Colombia prohibits the export of untanned hides and protects specimens less than 1.2 meters in length (Medem, 1970, in *litt.*).

BROWN CAIMAN

Caiman crocodilus fuscus (Cope)

DISTRIBUTION. Central America—southern Mexico to Colombia, west of the Andes (Medem, 1968; Schmidt, 1928b; Smith and Taylor, 1950; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. In the United States it is also called spectacled caiman, Central

American caiman, dusky caiman, and Magdalena caiman. In Central America it is called "alligator," *caimán*, *cocodrillo*, and *caajipal*. In Colombia it is known as *babilla*, *lagarto negro*, and *jacaretinga*. Hides are marketed under these names, and Central American *tinga*.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* No follicle glands. Full double osteoderm buttons present. Surface pitting evident. Transverse ventral scale rows 20 to 24. Single prominent ventral collar. Highest point of ventral scale slightly anterior of center (figure 39). *Sides:* Rows of large oval scales alternating with network of small irregular scales and creases. Maximum length of live specimen is 7 feet.

STATUS OF WILD POPULATIONS. Many wild populations are disappearing due to hide-hunting (Pan American Union, 1967). The subspecies is considered endangered by some experts (Honegger, 1968). South American countries prohibit the export of untanned hides. Colombia and Panama protect specimens less than 1.2 meters in length (Medem, 1970, in *litt.*; D. Tovar, 1970, in *litt.*). Peru protects specimens less than 1.5 meters in length (Honegger, 1968). Mexico's laws regulate hunting of this species.

YACARE

Caiman crocodylus yacare (Daudin)

DISTRIBUTION. Southern South America—specifically the Paraguay and Parana river drainage systems of Paraguay, Uruguay, Argentina, and Brazil, and the southern tributaries of the Amazon in Bolivia [the Mamore, Itenez, and Beni drainages] and Brazil [the Guapore drainage, and the Araguaia River above its confluence with the Tapirape] (Carvalho, 1955; Medem, 1968; Schmidt, 1928b; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It is also called the Paraguay caiman and red caiman in the United States. In South America it is called *caimán del Paraguay*, *casarudo*, *jacaré*, *jacaré de Lunetas*, *jacaretinga*, *lagarto*, *tinga*, *yacaré*, and *yacaré de hocico angosto*. Hides are marketed under these names.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* No follicle glands. Full double osteoderm buttons present. Surface pitting evident. Transverse ventral scale rows 20 to 25. Single prominent ventral collar. Highest point of ventral scale is slightly anterior of center (figure 39). *Sides:* Rows of large oval scales alternating with network of ir-

regular shaped small scales and creases. Maximum length of live specimen is 8 feet.

STATUS OF WILD POPULATIONS. Endangered (Pan American Union, 1967; U.S. Department of Interior, 1970). Most wild populations declining in numbers (Jose Ceí, 1970, in *litt.*). South American countries prohibit the export of untanned hides. Its import is prohibited under provisions of the Endangered Species Conservation Act (U.S. Department of Interior 1970).

BROAD-SNOURED CAIMAN

Caiman latirostris (Daudin)

DISTRIBUTION. Southern South America—the drainages of the Paraguay, Parana, and Uruguay rivers in Argentina, Uruguay, Paraguay, and Brazil, and the rivers emptying into the southeast coast of Brazil south of Recife (Carvalho, 1955; Medem, 1968; Schmidt, 1928b; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. In South America it is called *jacaré de Papo Amarelo*, *overo*, *ururau*, and *yacaré de hocico ancho*. Hides are marketed under these names.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* No follicle glands. Full double osteoderm buttons present. Surface pitting slight or absent. Transverse ventral scale rows 26 to 30. Double ventral collar. Highest point of ventral scale located at center of scale. *Sides:* Rows of large oval scales alternating with network of irregular shaped small scales and creases. Maximum length of live specimen is 9 feet.

STATUS OF WILD POPULATIONS. Endangered (Pan American Union, 1967). This species is nearly extinct from excessive hide hunting (Jose Ceí, 1970, in *litt.*). South American countries prohibit export of untanned hides.

BLACK CAIMAN

Melanosuchus niger (Spix)

DISTRIBUTION. Northern and central South America—Amazon basin drainages of Brazil, Colombia, Venezuela, Guyana, Peru, and Bolivia (Carvalho, 1955; Medem, 1963, 1968; Schmidt, 1928b; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. In South America it is called *asu*, *caimán*, *caimán negro*, *cocodrillo*, *jacaré açú*, *jacaré assú*, *jacaré asú*, *jacaré uassú*, *jacaré una*, and *yacaré assú*. Hides are marketed under these names.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* No follicle glands. Full double osteoderm buttons, at least medially. Lateral scales may lack osteoderms or possess small osteoderms in center of scales. Surface pitting slight. Transverse ventral scale rows 25 to 28. *Sides:* Parallel rows of large oval scales alternating with rows of small oval scales. Maximum length of live specimen is 16 feet.

STATUS OF WILD POPULATIONS. Endangered (Honegger, 1968; Pan American Union, 1967). Rapidly declining everywhere, and exterminated in many areas. South American countries prohibit the export of untanned hides. Peru prohibits the killing of specimens less than 2 meters in length (Honegger, 1968).

DWARF CAIMAN

Paleosuchus palpebrosus (Cuvier)

DISTRIBUTION. Northern and central South America — Amazon and Orinoco river drainages of Colombia, Venezuela, Guyana, Brazil, Peru, Ecuador, and Bolivia (Carvalho, 1955; Medem, 1967, 1968; Schmidt, 1928b; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It is also called musky caiman and Cuvier's smooth-fronted caiman. In South America it is called *cachirré*, *jacaré coroa*, and *yacaré coroa*. Hides are marketed under these names.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* No follicle glands. Full double osteoderm buttons on all large ventral scales. Surface pitting slight or absent. Transverse ventral scale rows 18 to 22. Single prominent ventral collar. *Sides:* Large scales scattered, not in well-defined rows, and separated by wide areas of soft skin. Maximum length of live specimen is 5½ feet.

STATUS OF WILD POPULATIONS. Declining in numbers (Pan American Union, 1967). *Paleosuchus* is possibly the least persecuted of the crocodylians at the present time. Its small size and heavy osteoderm buttons make the skins less desirable than skins from the larger caimans and crocodiles of South America. South American countries prohibit the export of untanned hides.

SMOOTH-FRONTED CAIMAN

Paleosuchus trigonatus (Schneider)

DISTRIBUTION. Northern and central South America — the Amazon and Orinoco river drainages of Colombia, Venezuela, Guyana,

Brazil, Ecuador, Peru, and Bolivia (Carvalho, 1955; Medem, 1967, 1968; Schmidt, 1928b; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It is also called Schneider's smooth-fronted caiman. In South America it is called *cachirré*, *jacaré coroa*, *jacaré curuá*, and *yacaré coroa*. Hides are marketed under these names.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* No follicle glands. Full double osteoderm buttons on all large ventral scales. Surface pitting slight or absent. Transverse ventral scale rows 18 to 22. Single prominent ventral collar. *Sides:* Scattered large keeled oval scales, not in well-defined rows, and separated by wide areas of soft skin. Maximum length of live specimen is 7 feet.

STATUS OF WILD POPULATIONS. Declining in numbers (Pan American Union, 1967). *Paleosuchus* is possibly the least persecuted of the crocodylians. Its small size and heavy ossification of the osteoderms makes the skins less desirable than skins from the larger caimans and crocodiles of South America. South American countries prohibit the export of untanned hides.

Family CROCODYLIDAE

AMERICAN CROCODILE

Crocodylus acutus Cuvier

DISTRIBUTION. Florida, West Indies, Central and northern South America — southern Florida, Cuba, Hispaniola (Haiti and Dominican Republic), Jamaica, Mexico south to Colombia and Venezuela, exclusive of the Orinoco river drainage system (Cochran, 1941; Medem, 1968; Smith and Taylor, 1950; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. In Central America and Cuba it is called *caimán*, and in South America it is known as *caimán* and *caimán de aguja*. Hides may be marketed under these names, or simply as Central or South American "alligator," crocodile, soft-belly, small scale (north of Panama) or large scale (south of Panama).

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 25 to 35. Tail whorls regular ventrally. Maximum length of live specimen is 23 feet.

STATUS OF WILD POPULATIONS. Declining everywhere due to excessive hide-hunting (Pan American Union, 1967). The species is considered endangered by some experts (Honegger, 1968). Many populations in Central and South America have been totally exterminated. The species is protected by state law in Florida, and South American countries prohibit the export of untanned hides. Mexico regulates the hunting of the species, as does Nicaragua. Jamaica prohibits the export of crocodiles, their eggs, or skins (K.C. Hall, 1970, in *litt.*). The species is protected in Cuba and Colombia, although the law is not enforced in the latter (Honegger, 1968).

AFRICAN SLENDER-SNOURED CROCODILE

Crocodylus cataphractus Cuvier

DISTRIBUTION. Western and central Africa—the Congo, Niger, and Volta river drainages, and the coastal rivers from Senegal south to northern Angola. Only once recorded from East Africa at Ujiji, Tanzania, on Lake Tanganyika (Schmidt, 1919; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It is sometimes called the West African crocodile, African long-nosed crocodile, African gavial, or sub-water crocodile. Hides are sold under these names or as Nigerian, Congo, or Cabinde “alligator,” crocodile, or button hides.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. Round or elliptical single osteoderm buttons present. Surface pitting may or may not be present. Transverse ventral scale rows 25 to 29. Hides from Nigeria usually are missing the tip of the tail, due to local hunting practices. Skins from other parts of Africa usually have complete tails. Maximum length of live specimen is 13 feet.

STATUS OF WILD POPULATIONS. Critically endangered (A. C. Pooley, 1971, personal communication). This species is limited to large rivers, and is rarely abundant anywhere. Populations are declining everywhere due to hide hunting and the spread of human population (Lowes, 1970).

ORINOCO CROCODILE

Crocodylus intermedius Graves

DISTRIBUTION. Northern South America—the Orinoco river drainage of Colombia (east of the Andes), Venezuela, and possibly Guyana (Medem, 1968; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It is called *caimán* in South America. It is marketed under this name, or as Colombian, Venezuelan, or Venezuelan delta “alligator,” crocodile, large scale, or soft-belly.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 20 to 25. Tail whorls usually regular. Maximum length of live specimen is 23 feet.

STATUS OF WILD POPULATIONS. Endangered (Pan American Union, 1967; U.S. Department of Interior, 1970). Because of excessive hide hunting the species is now rare in Venezuela, and apparently exterminated in Colombia (Honegger, 1968). South American countries prohibit the export of untanned hides. Colombia has legislation prohibiting the hunting of crocodiles, but it is not enforced (Honegger, 1968). Import is prohibited under provision of the Endangered Species Conservation Act (U.S. Department of Interior, 1970).

JOHNSON'S CROCODILE

Crocodylus johnsoni Krefft

DISTRIBUTION. Northern Australia—from the Fitzroy River in northern Western Australia to Mackay in eastern Queensland (Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933; Worrell, 1963).

OTHER COMMON NAMES. In Australia it is called the freshwater crocodile, Johnson's river crocodile, Johnstone's crocodile, and fish crocodile. It may be marketed under these names, or as Australian or Singapore “alligator,” gator, crocodile, soft-belly, or large scale.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 22 to 24. Tail whorls usually regular. Maximum length of live specimen is 9½ feet.

STATUS OF WILD POPULATIONS. Rare (Honegger, 1968). The species is completely protected by law in Western Australia and Northern Territories, but skins are still shipped from Queensland (Fauna Preservation Society, 1970b; Green, 1969; Honegger, 1968).

MORELET'S CROCODILE

Crocodylus moreletii Duméril, Bibron and Duméril

DISTRIBUTION. Northern Central America—Atlantic and Pacific coasts of Mexico, British Honduras, and Guatemala (Smith and Taylor,

1950; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It is sometimes called Belize crocodile or Central American crocodile. In Central America it is called "alligator," *caimán*, and *lagarto de El Petén*. Hides are marketed under these names, or as Mexican "alligator," crocodile, small scale, or soft-belly.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 27 to 32. Tail whorls irregular (66 percent of the time). Maximum length is 8 feet.

STATUS OF WILD POPULATIONS. Endangered (Honegger, 1968; Pan American Union, 1967; U.S. Department of Interior, 1970). This species has all but been eliminated from British Honduras and parts of Guatemala (Charnock-Wilson, 1970). It is still locally abundant in parts of Mexico (Fauna Preservation Society, 1969b). Mexico has protective laws but they are unenforced (Honegger, 1968). Guatemala began enforcing its protective legislation in 1970. Importation is prohibited under provision of the Endangered Species Conservation Act (U.S. Department of Interior, 1970).

NILE CROCODILE

Crocodylus niloticus Laurenti

DISTRIBUTION. Africa (all of Africa except the northwest corner and central Sahara); east along the Mediterranean coast to Syria; Malagasy Republic (Madagascar); and Seychelles, Comoros, and Mauritius (Schmidt, 1919; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It is also called the Nilotic crocodile. Hides are marketed as African, Ethiopian, Kenya, Madagascan, or Nile "alligator," "caiman," crocodile, small scale, button-belly, or soft-belly.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. Usually no buttons, but occasionally single buttons may be present in the midbelly and collar area. Transverse ventral scale rows 26 to 32. Tail whorls usually regular. Hides from Nigeria have the tip of the tail missing due to local hunting practices. The tails are complete on hides from elsewhere. Maximum length of live specimen is probably 18 feet.

STATUS OF WILD POPULATIONS. Endangered (Cott, 1961; Honegger, 1968; Pooley,

1969; U.S. Department of Interior, 1970). This species has been exterminated over large areas of Africa by hide hunters (Fauna Preservation Society, 1969c, 1969d, 1970a; Lowes, 1970; Pooley, 1970, in *litt.*). It can be found in numbers only in small local populations. It is extinct in the Seychelles and Mauritius. It is protected by law in most East African countries and in national parks and game preserves (Cott, 1969). Hunting of this species is to be regulated throughout all of Africa by the African Convention for the Conservation of Nature and Natural Resources (Burhenne, 1970; Honegger, 1968). South Africa has set up a research program in hopes of saving the species and restocking it in areas where it has been exterminated (Pooley, 1970). Importation is prohibited under provision of the Endangered Species Conservation Act (U.S. Department of Interior, 1970).

NEW GUINEA CROCODILE

Crocodylus novaeguineae novaeguineae
Schmidt

DISTRIBUTION. New Guinea (Schmidt, 1928a, 1932; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It is also called the New Guinea freshwater crocodile. Hides may be marketed as Australia, New Guinea, or Singapore "alligator," crocodile, soft-belly, or large scale.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 24 to 25. Tail whorls usually regular. Maximum length of live specimen is 9½ feet.

STATUS OF WILD POPULATIONS. Rare (Honegger, 1968). Populations are declining rapidly due to hide hunting. Specimens over 20 inches in belly width are protected by laws in most of Papua and Northeast New Guinea (Bustard, 1970; Fauna Preservation Society, 1969a; Honegger, 1968).

PHILIPPINE CROCODILE

Crocodylus novaeguineae mindorensis Schmidt

DISTRIBUTION. Philippine Islands—Luzon, Mindoro, and Mindanao Islands (Schmidt, 1935; Wermuth, 1953; Wermuth and Mertens, 1961).

OTHER COMMON NAMES. Also called the Mindoro crocodile and Philippine freshwater crocodile. Hides may be marketed under the name Philippine or Singapore "alligator," crocodile, soft-belly, or large scale.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 24 to 26. Tail whorls usually regular. Maximum length of live specimen is 8 feet.

STATUS OF WILD POPULATIONS. Rare, possibly endangered. Hide hunting is eliminating the species from parts of its former range.

MUGGER CROCODILE

Crocodylus palustris palustris Lesson

DISTRIBUTION. India and Pakistan — from the Dasht River in West Pakistan through all the river systems of India to the Brahmaputra River drainage in the east (De Rooij, 1915; Schmidt, 1935; Smith, 1931; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. Also called the marsh crocodile, broad-snouted crocodile, swamp crocodile, and Indian freshwater crocodile. Hides may be marketed as Indian "alligator," crocodile, soft-belly, or small scale.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 26 to 32. Ventral collar not distinct (no enlarged scales). Tail whorls usually regular. Maximum length of live specimen is 13 feet.

STATUS OF WILD POPULATIONS. Endangered. The species is protected in India by a ban on the export of crocodile hides, and in Pakistan by a ban on the export of all wild animal hides (Fauna Preservation Society, 1967, 1970c; Mountfort, 1969).

CEYLON MUGGER CROCODILE

Crocodylus palustris kimbula Deraniyagala

DISTRIBUTION. Ceylon (Deraniyagala, 1936, 1939, 1953; Wermuth, 1953; Wermuth and Mertens, 1961).

OTHER COMMON NAMES. It is also called the Ceylon swamp crocodile, Ceylon marsh crocodile, and lake crocodile. In Ceylon it is known as *hale kimbula*, *ala kimbula*, and *kulathi muthela*. It may be marketed as Ceylon "alligator," crocodile, soft-belly, or small scale.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 26 to 32. Ventral collar present and distinct. Tail whorls regular. Maximum length of live specimen is 18 feet.

STATUS OF WILD POPULATIONS. Declining in numbers. Hunting is regulated by the Ceylon government (Fauna Preservation Society, 1970e).

SALTWATER CROCODILE

Crocodylus porosus Schneider

DISTRIBUTION. India and Ceylon east to Australia and New Guinea — the coastal rivers, lagoons, and marshes from Cochin in extreme southwestern India east to Ceylon, Burma, Malaysia, Thailand, Cambodia, Vietnam, Indonesia, the Philippines, Palau Islands, northern Australia, New Guinea, Solomon Islands, New Hebrides, and Fiji (Deraniyagala, 1939, 1953; De Rooij, 1915; Schmidt, 1932; Taylor, 1970; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933; Worrell, 1963).

OTHER COMMON NAMES. It is also called the estuarine crocodile, gator (in Australia), and sea-going crocodile. In Ceylon it is known as *pita gatteya*, *gatte kimbula*, *gorekeya*, and *semumukhan*; in Indonesia, *buaja*; in Malaysia, *buaja*, *buaya*, *haya*, and *rawing*. Hides may be marketed under these names, or as Indian, Javan, Philippine, Singapore, Sumatran, or Thailand "alligator," crocodile, soft-belly, or small scale.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 30 to 35. Tail whorls regular. Maximum length of live specimen is probably 25 feet.

STATUS OF WILD POPULATIONS. Most populations are declining rapidly due to hide hunting, and the species is non-existent in some parts of its former range where it was once abundant (Fauna Preservation Society, 1970d; Honegger, 1968). It is partially protected in most of Papua and North East New Guinea, where specimens over 20 inches belly width may not be killed (Fauna Preservation Society, 1969a; Bustard, 1970). The species is completely protected in Western Australia until 1980 (Fauna Preservation Society, 1970b; Honegger, 1968). Indonesia has imposed size limits. Ceylon, India, and Pakistan protect the species completely by banning the export of all crocodile skins or the skins of all wild animals (Fauna Preservation Society, 1967; Honegger, 1968; Mountfort, 1969). Singapore requires export licenses. Deraniyagala (1939, 1953) mistakenly listed this species as occurring on the Seychelles and Mauritius where *Crocodylus niloticus* was known to occur in the past.

CUBAN CROCODILE*Crocodylus rhombifer* Cuvier

DISTRIBUTION. Cuba and the Isle of Pines (Barbour and Ramsden, 1919; Varona, 1966; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. In Cuba it is called *cocodrilo*, *cocodrilo perla*, *cocodrilo criollo*, *cocodrilo legitimo*, *caimán*, and occasionally *zaquendo*.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 32 to 33. Tail whorls regular. Maximum length of live specimen is 16 feet.

STATUS OF WILD POPULATIONS. Endangered (Honegger, 1968; U.S. Department of Interior, 1970). The species once occurred on the Isle of Pines from which it has been exterminated. Today it only occurs in remnants of the Zapata Swamp on the south coast of Cuba, but hide hunting and land drainage has made it very nearly extinct even there. The Cuban government protects this species rigidly and has established a captive breeding facility in the Zapata Peninsula National Park in an attempt to save it from extinction (Honegger, 1968). Importation is prohibited under provision of the Endangered Species Conservation Act (U.S. Department of Interior, 1970).

SIAMESE CROCODILE*Crocodylus siamensis* Schneider

DISTRIBUTION. Southeast Asia—Thailand, Cambodia, Vietnam, and Java (De Rooij, 1915; Smith, 1931; Taylor, 1970; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It may also be called the Siamese freshwater crocodile. In Indonesia it is called *buaja*. Hides may be sold as Java, Singapore, or Thailand "alligator," crocodile, soft-belly or small scale.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 30 to 34. Tail whorls regular. Maximum length of live specimen is 13 feet.

STATUS OF WILD POPULATIONS. Endangered. It has always been a rare animal in Indonesia, and became scarce in Thailand 30 years ago due to hide hunting. Today fewer than 200 remain in the wild in Thailand, but approximately 9,000 specimens are protected in the Sumatprakan Crocodile Farm in Bangkok (U.

Youngparpakorn, 1971, personal communication).

WEST AFRICAN DWARF CROCODILE*Osteolaemus tetraspis tetraspis* Cope

DISTRIBUTION. West Africa—the Niger and Senegal river drainages and other rivers south of the Sahara and north of the Congo River drainage (Schmidt, 1919; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It is also called the broad-snouted crocodile. Hides may be marketed as African "caiman," button-belly, bony crocodile, black crocodile, or rough-back crocodile.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. Large single osteoderm buttons present. Surface pitting usually evident. Transverse ventral scale rows 21 to 27. Maximum length of live specimen is 6½ feet.

STATUS OF WILD POPULATIONS. Endangered (A. C. Pooley, 1971, personal communication). Populations declining due to hide hunting, destruction of habitat, and live animal collecting (Lowe, 1970). This species has never been as abundant as the other African species.

CONGO DWARF CROCODILE*Osteolaemus tetraspis osborni* (Schmidt)

DISTRIBUTION. Central Africa—the Congo River drainage (Schmidt, 1919; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. Also called the Central African dwarf crocodile, Osborn's dwarf crocodile, and African broad-snouted crocodile. Hides may be marketed as African "caiman," button-belly, bony crocodile, black crocodile, or rough-back crocodile.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. Large single osteoderm buttons present. Surface pitting usually evident. Transverse ventral scale rows 21 to 27. Maximum length of live specimen is 5 feet.

STATUS OF WILD POPULATIONS. Endangered (A. C. Pooley, 1971, personal communication). This species does not occur in large populations. Its numbers are declining due to hide hunting.

FALSE GAVIAL*Touistoma schlegelii* (Muller)

DISTRIBUTION. Southeast Asia—Indonesia (Kalimantan and Sumatra) and Malaysia

(De Rooij, 1915; Taylor, 1970; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. It is also called the Malay gavial, Malayan gharial, and Malayan fish crocodile. In Indonesia it is called *bediai sampit* and *buaya sapit*; in Malaya, *buaya senjulong*; in Sarawak, *baya kanulong*. Hides may be sold under these names, or as Singapore "alligator," crocodile, soft-belly, or large scale.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 22 to 24. Tail whorls usually regular. Maximum length of live specimen is 16 feet.

STATUS OF WILD POPULATIONS. Declining in numbers, soon to be endangered. Hide hunters have so decimated the populations of this animal in Malaysia that protective legislation is being considered (Lucas Chin, 1970, personal communication).

Family GAVIALIDAE

GAVIAL

Gavialis gangeticus (Gmelin)

DISTRIBUTION. India, Pakistan, and Burma — specifically the Indus, Mahandi, Ganges, Brahmaputra, and Kaladan river drainage systems, and possibly parts of the Irawaddy system in northwestern Burma (Smith, 1931; Wermuth, 1953; Wermuth and Mertens, 1961; Werner, 1933).

OTHER COMMON NAMES. In India it is called *gharial*. Hides may be sold as Indian soft-belly, small scale, "alligator," "crocodile," or gavial.

DISTINGUISHING CHARACTERISTICS OF COMMERCIAL HIDES. *Belly skins:* Follicle glands present. No osteoderm buttons. Transverse ventral scale rows 30 to 31. Ventral collar not prominent. Maximum length of live specimen is 21½ feet.

STATUS OF WILD POPULATIONS. Endangered (U.S. Department of Interior, 1970). Protected in India by a ban on the export of all crocodilian hides, and in Pakistan by a ban on the export of all wild animal hides (Fauna Preservation Society, 1967, 1970c; Mountfort, 1969). Importation is prohibited under provisions of the Endangered Species Conservation Act (U.S. Department of Interior, 1970).

ACKNOWLEDGMENTS

We wish to thank David Klapisch (Southern Trading Corporation, Newark, New Jersey), Hyman Marx (Field Museum of Natural History, Chicago), Henry Molt (Philadelphia Reptile Exchange), Charles Myers (American Museum of Natural History, New York), Ray Pawley (Chicago Zoological Park), Barry Wakeman (Cincinnati Zoological Society), George Zug (U.S. National Museum, Washington, D.C.) for the opportunity of examining specimens and skins in their care. We also wish to thank Edward Baker and Warren Difendall (United States Department of Interior, Department of Sport Fish and Wildlife, New York), Claire Hagen (Hagen and Company, New York), and Glenn Kindler (Connecticut Import Export Corporation, New York) for their assistance. Rene Honegger kindly lent us an advance copy of the International Union for the Conservation of Nature and Natural Resources Red Data Book on amphibians and reptiles so that we might include some of the information here. Jose Ceí, Lucas Chin, Federico Medem, A. C. Pooley, James Powell, and others provided personal observations on wild populations of crocodilians. William Meng (New York Zoological Society) provided photos.

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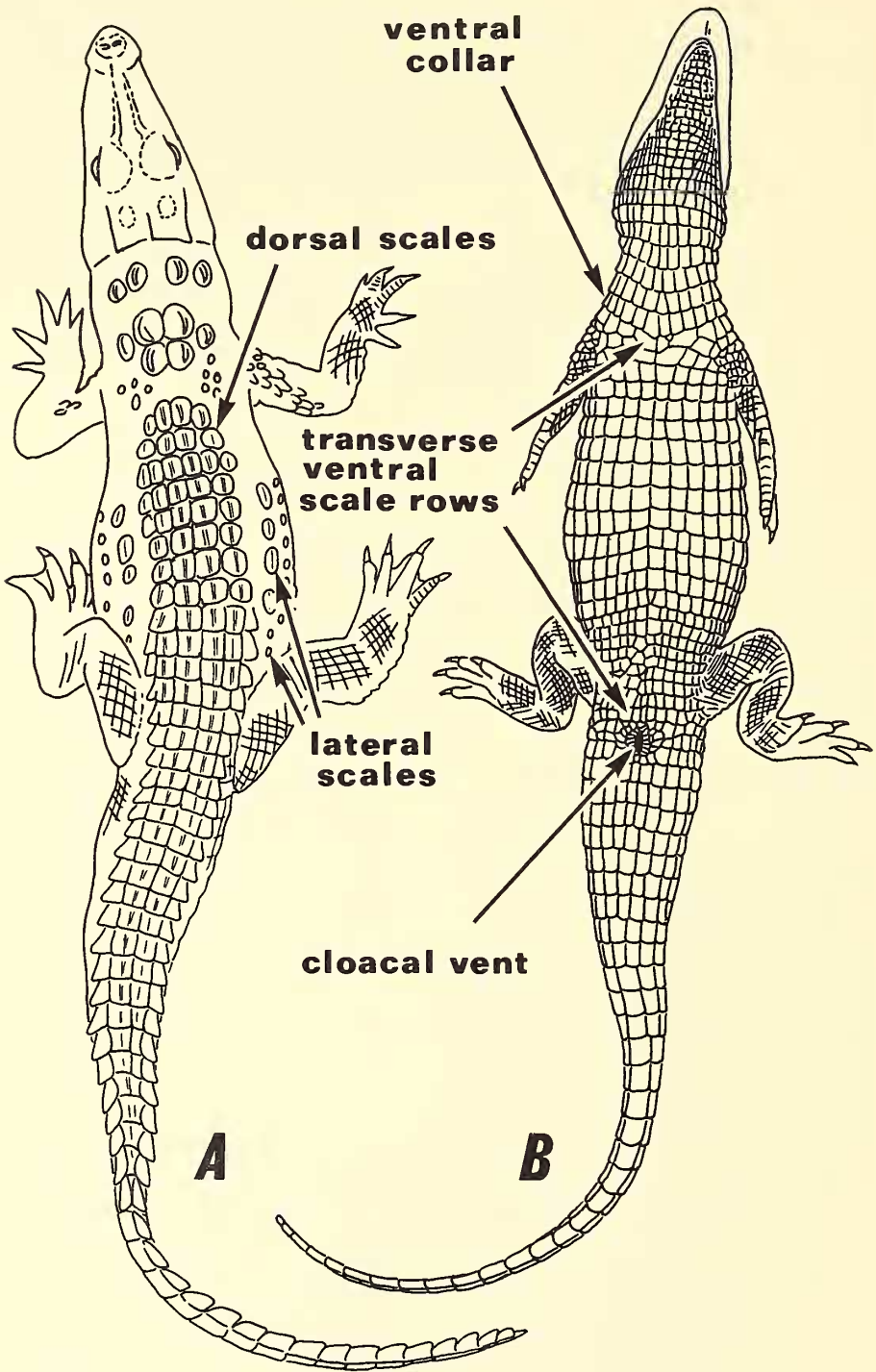


FIGURE 1. Diagrammatic dorsal (A) and ventral (B) views of a crocodilian. Hornback hides consist of most of the skin seen in A (skull and feet are absent). Belly hides consist of most of the skin seen in B (skull and feet are absent and the lateral [side] skin is attached). Transverse scale rows are counted by beginning and ending with the rows indicated by the arrows.

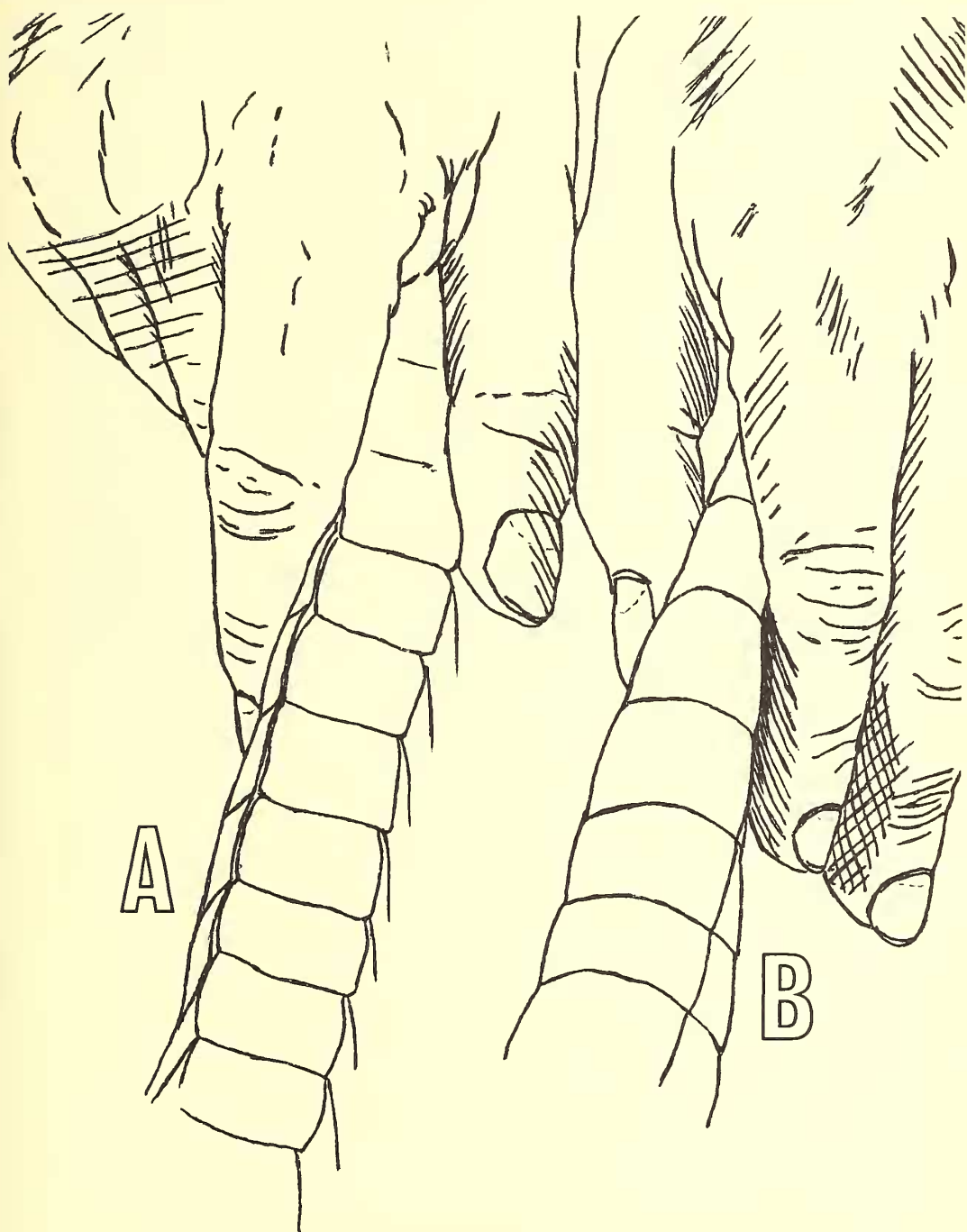


FIGURE 2. Comparative flexibility of a button-belly (A) and a soft-belly (B) hide. The hard osteoderms in the scales permit the button-belly hide to flex only between the scales, while the soft-belly hide will also flex through the scales.

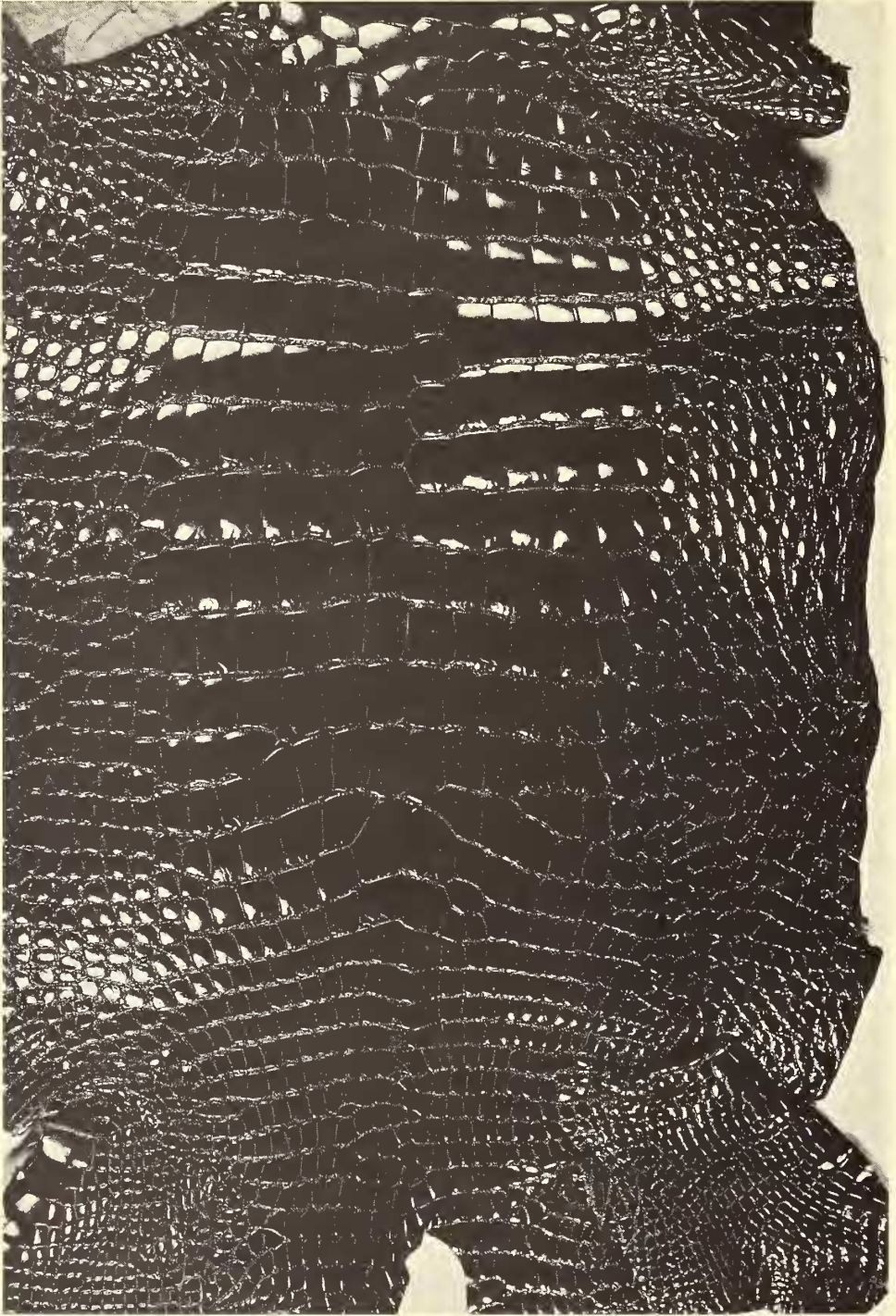


FIGURE 3. Outside surface of a finished American alligator (*Alligator mississippiensis*) belly hide. Closer views of the ventral scales and spider-web umbilicus are provided in figures 5 and 7.

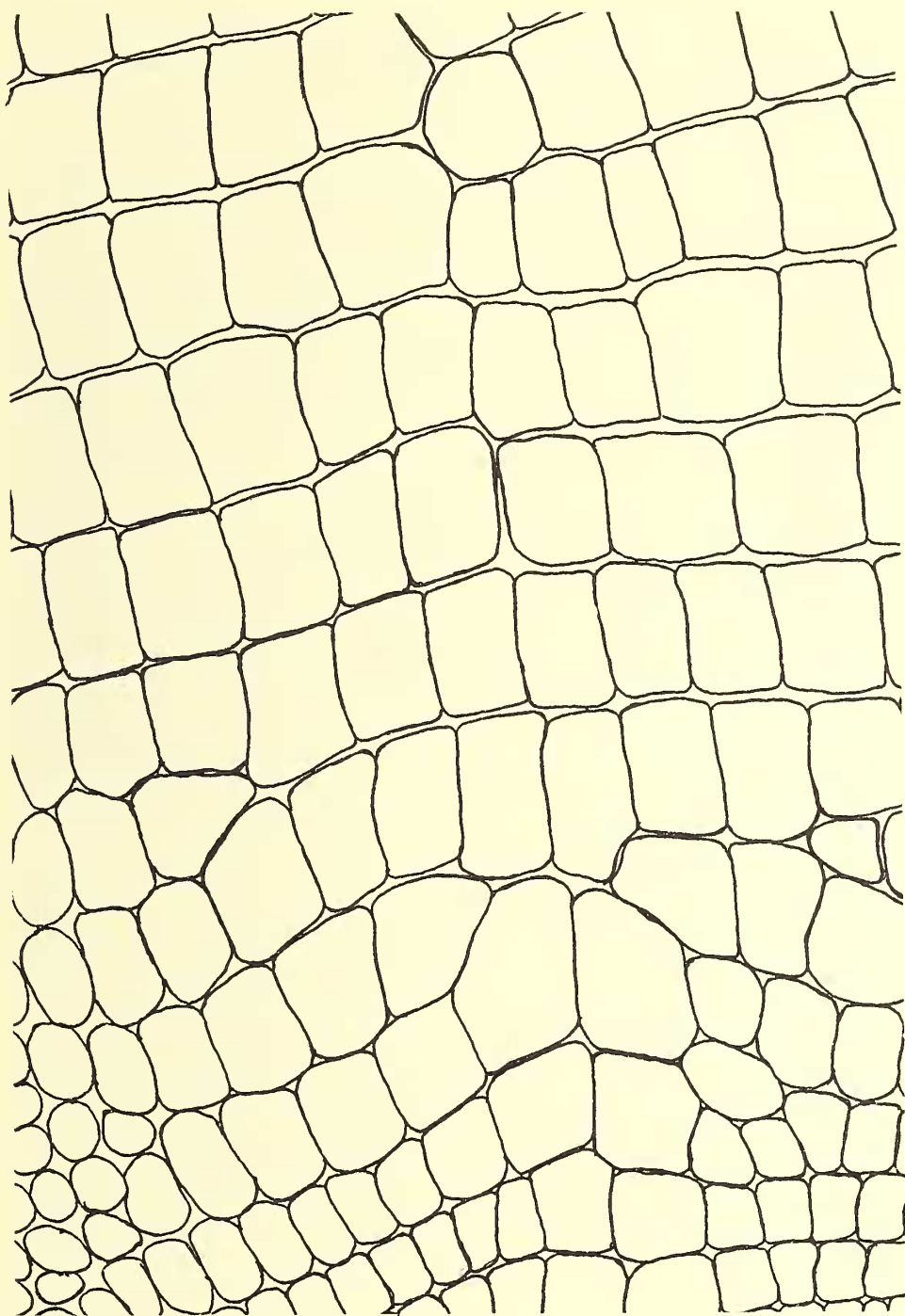


FIGURE 4. Diagrammatic illustration of the American alligator ventral scales shown in figure 5. Note the lack of both surface pitting and follicle glands.

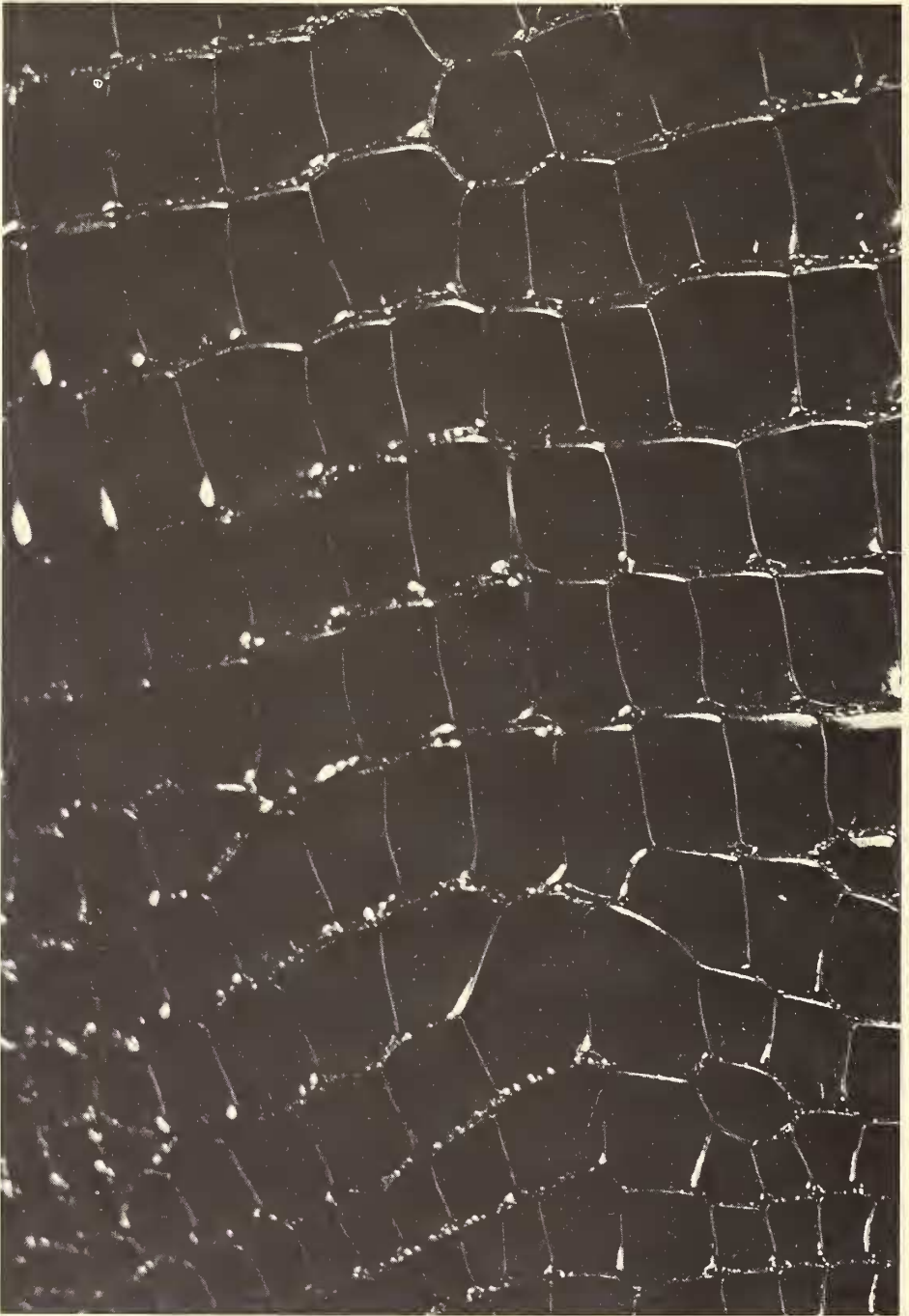


FIGURE 5. Ventral scales of a finished American alligator (*Alligator mississippiensis*) belly hide. Compare it with figure 4.

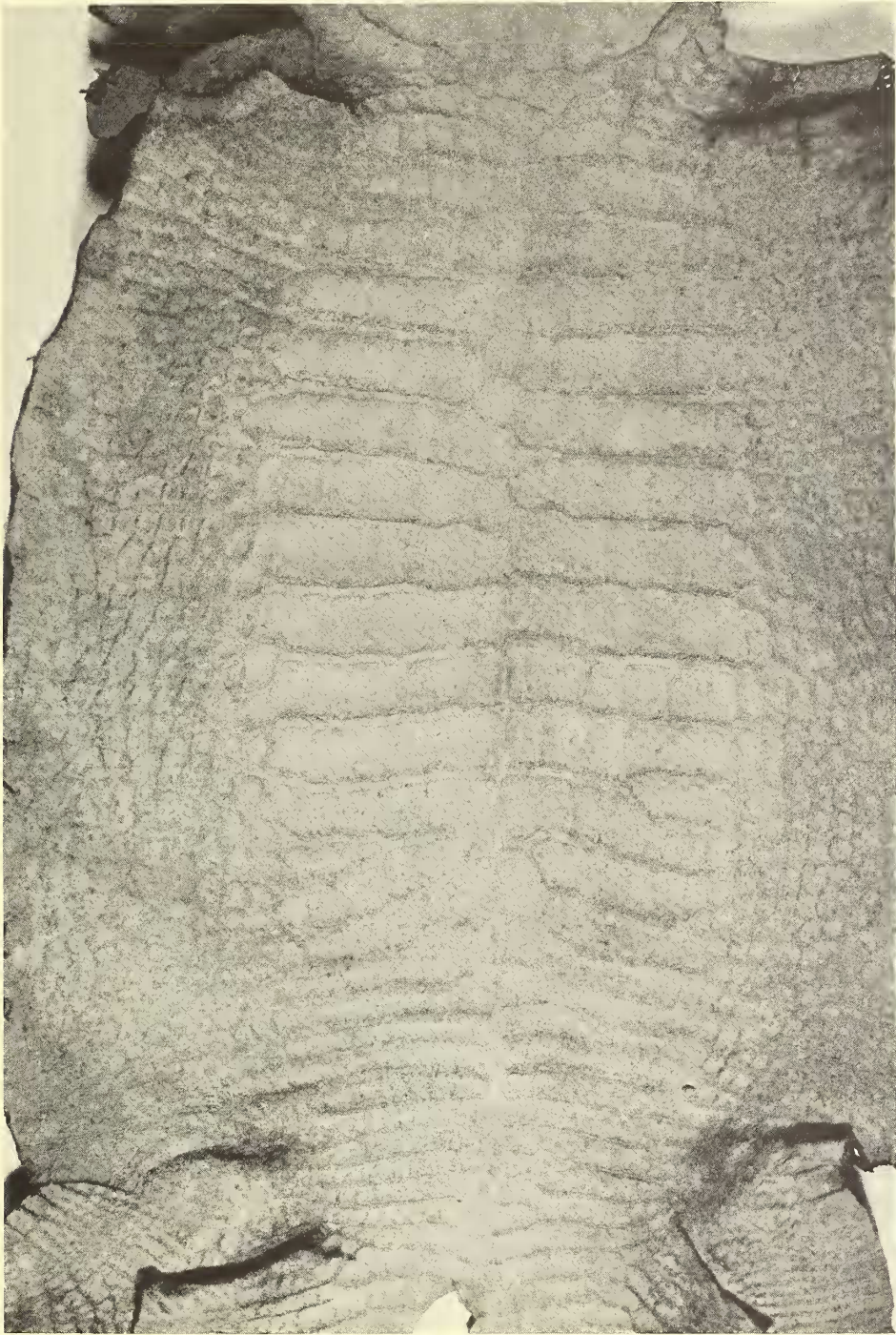


FIGURE 6. Inside surface of a finished adult American alligator (*Alligator mississippiensis*) belly hide. Note the total absence of osteoderm buttons, which indicates the specimen probably came from Louisiana. Compare the inside of the ventral collar, just visible at the top of the photograph, with figure 8.

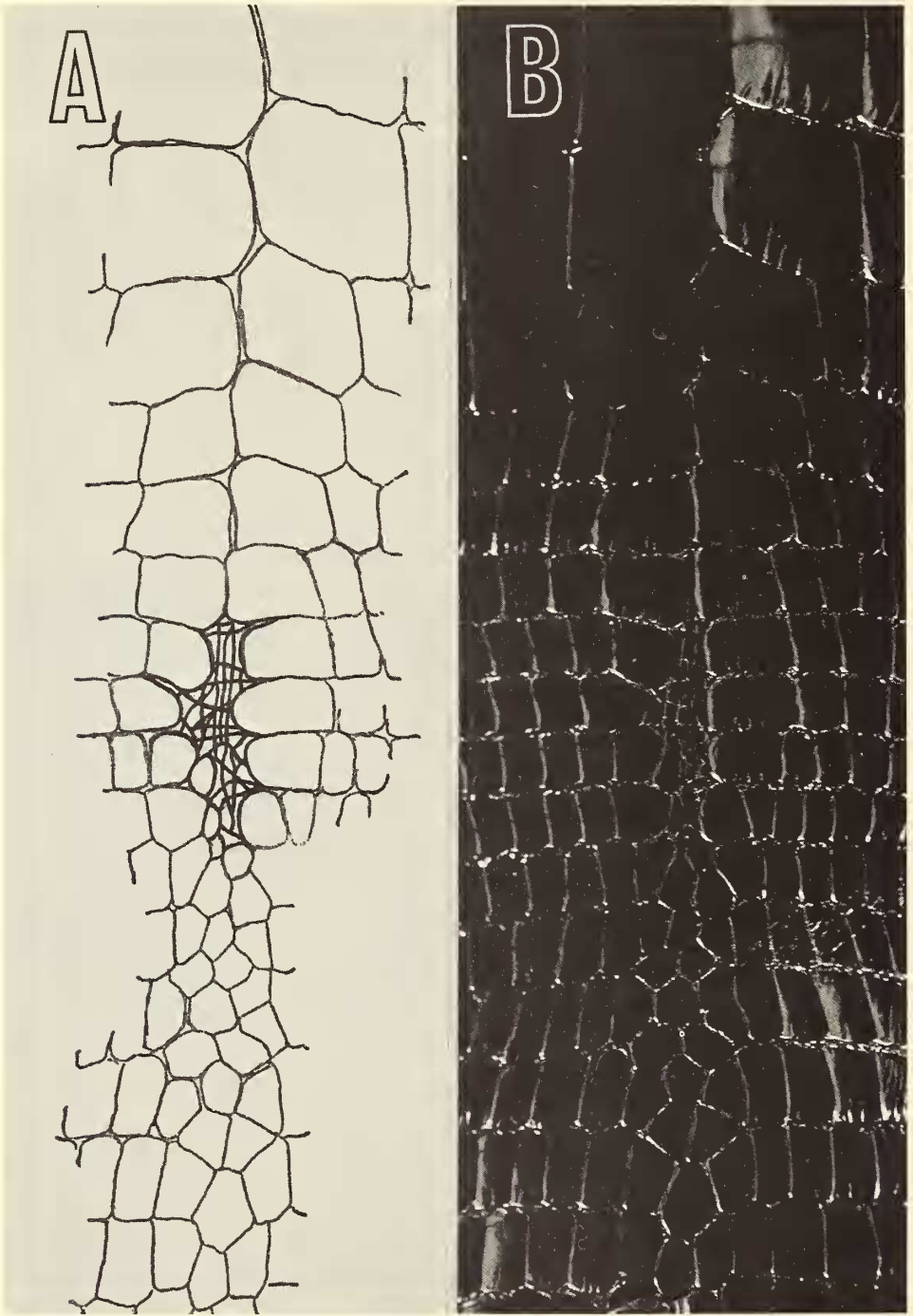


FIGURE 7. The spider-web umbilicus typical of American alligator (*Alligator mississippiensis*) belly hides – A is a diagrammatic illustration of the photograph B. Also note the absence of both surface pitting and follicle glands on the ventral scales.



FIGURE 8. Inside surface of a finished American alligator (*Alligator mississippiensis*) hide from Florida. The portion shown is from the throat area as evidenced by the ventral collar. The dark round blotches in the center of the scales are single osteoderm buttons.

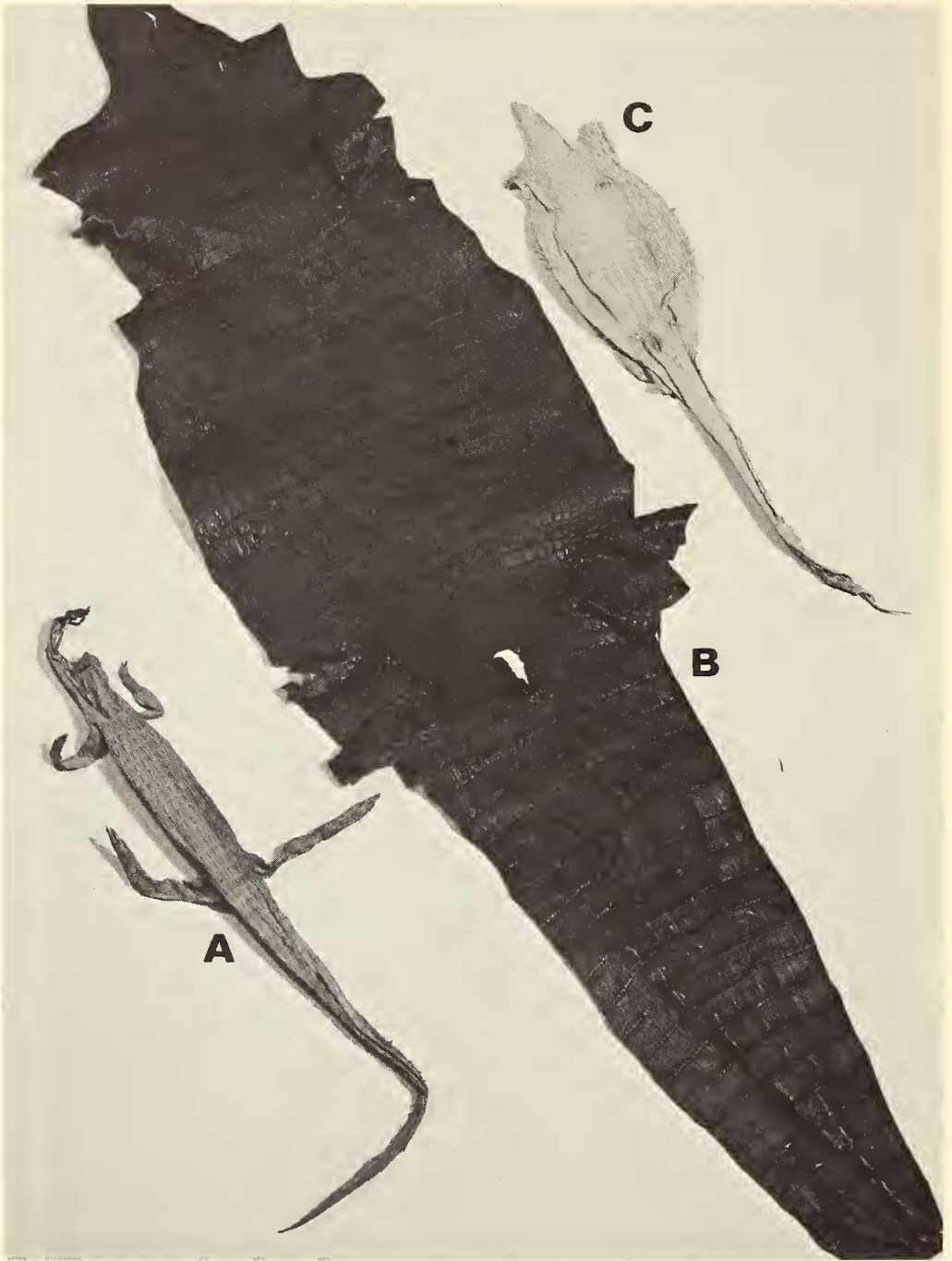


FIGURE 9. Hornback (A) and belly hides (B and C) of a South American caiman (*Caiman crocodilus*). Note the presence of the vent in both belly hides. A and C are crusts. B is a hide with *sauvage* finish.



FIGURE 10. Outside surface of a crust belly hide of a South American caiman (*Caiman crocodilus*). Note the surface pitting which is indicative of underlying osteoderm buttons.



FIGURE 11. Ventral scales of a South American caiman (*Caiman crocodilus*) crust. Note the surface pitting. Lateral scales are just visible on the right side of the photograph.

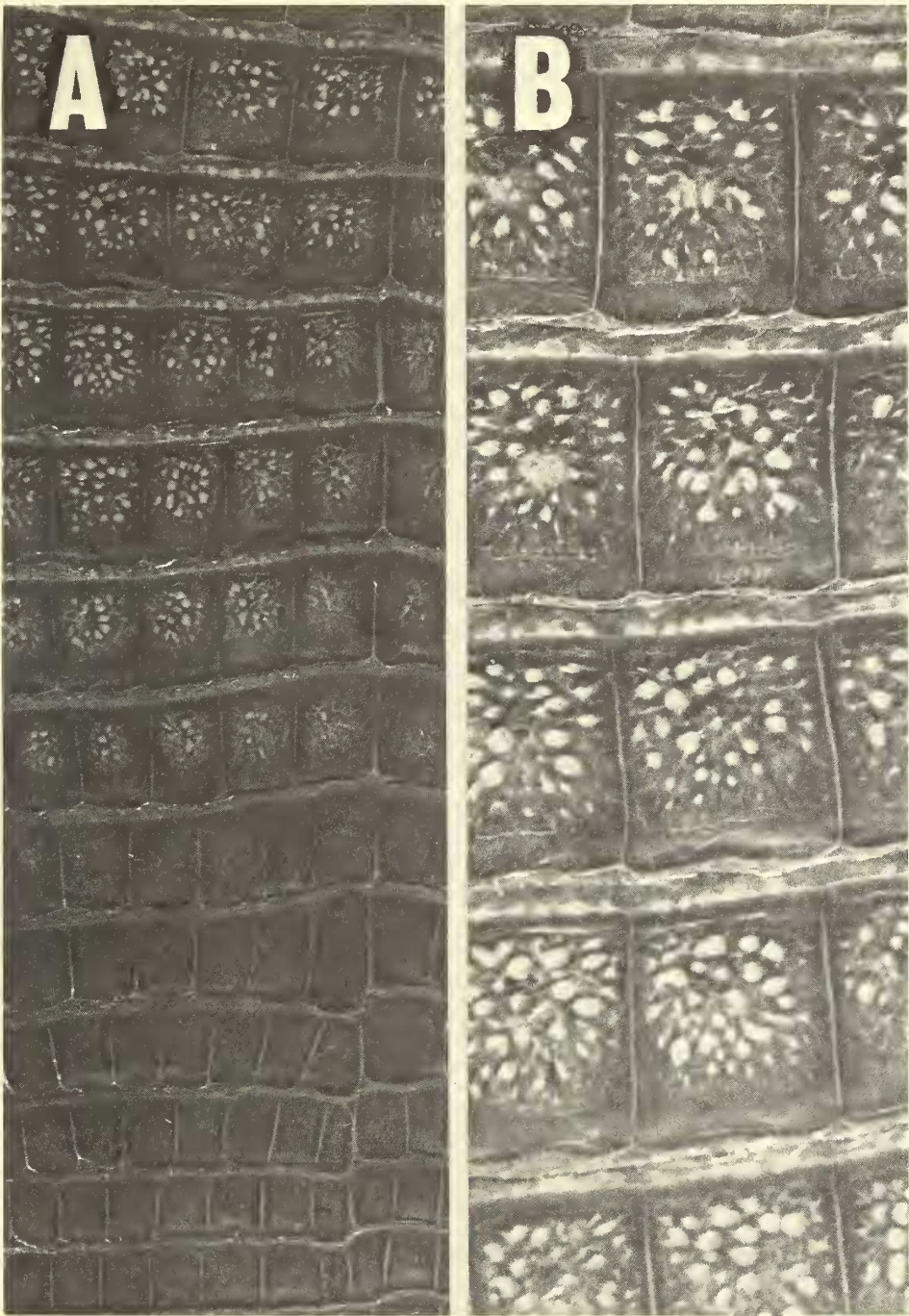


FIGURE 12. Ventral scales of a finished South American caiman (*Caiman crocodilus*) belly hide. Photograph B is a close view of the scales seen in A. Because of the technique used to dye this hide, the surface pits are white against a dark background. Note that the pitting is not as pronounced near the vent (lower half of A) as near midbelly (upper half of A).

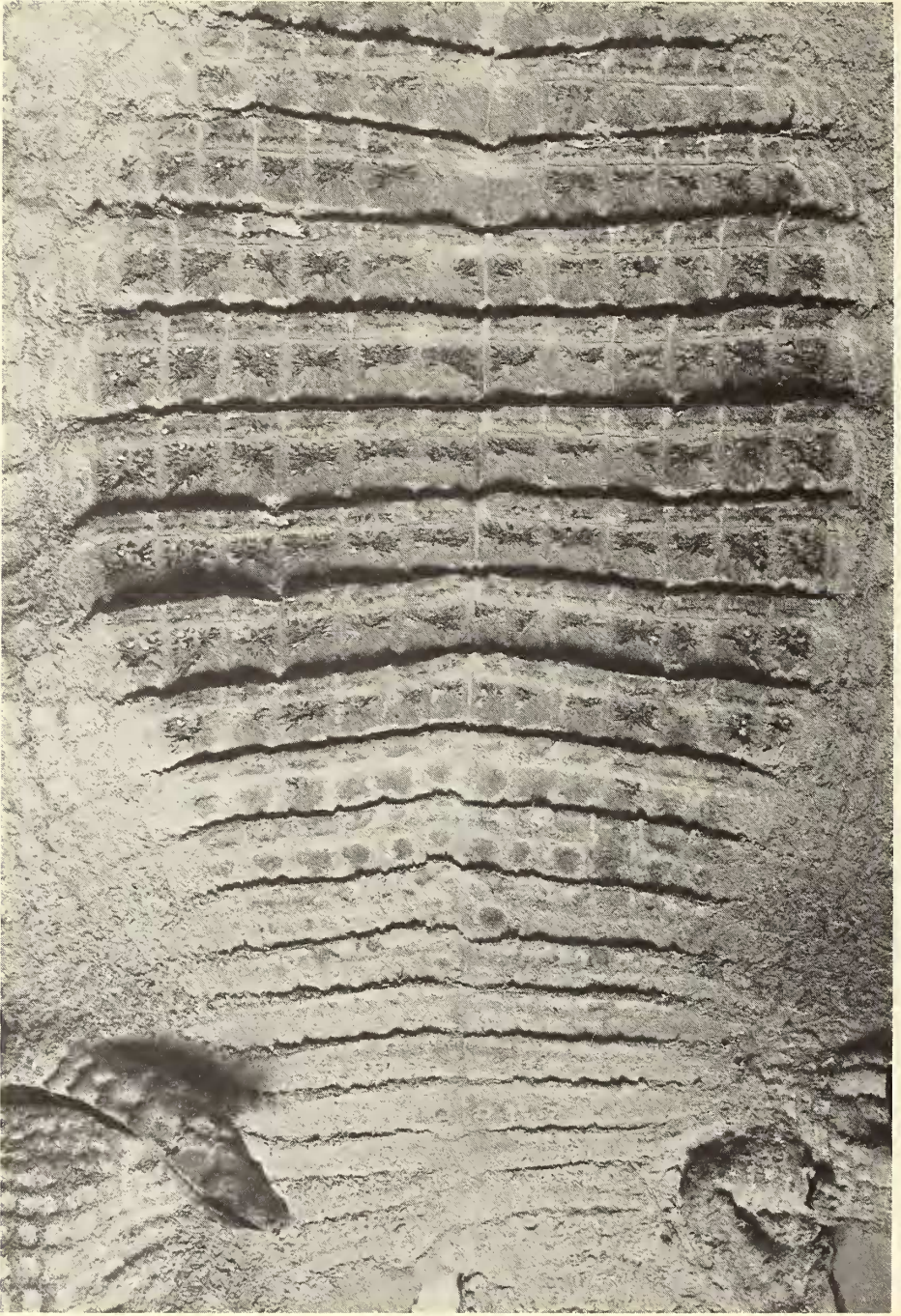


FIGURE 13. Inside surface of a South American caiman (*Caiman crocodilus*) crust. Note the presence of double osteoderm buttons in the ventral scales. Closer views are provided in figure 14.

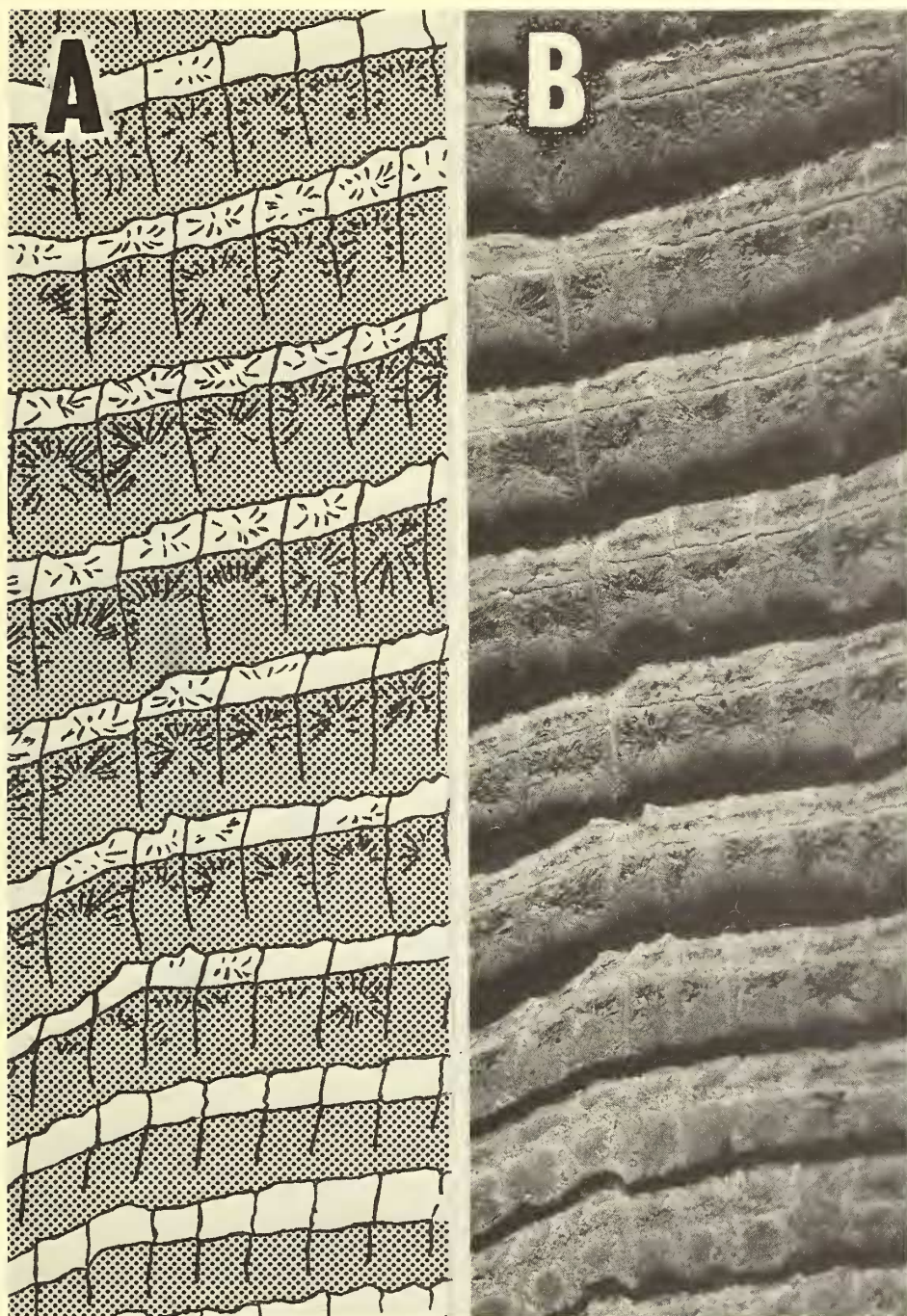


FIGURE 14. Double osteoderm buttons on the inside surface of a South American caiman (*Caiman crocodilus*) belly crust. A is a diagrammatic illustration of the photograph B. Each ventral scale contains two osteoderms, double buttons. The larger posterior button is shaded in A, while the smaller inward-curving anterior button is unshaded. Most of the anterior button is removed when the hide is shaved. Compare this figure with the shaved hide in figure 19.

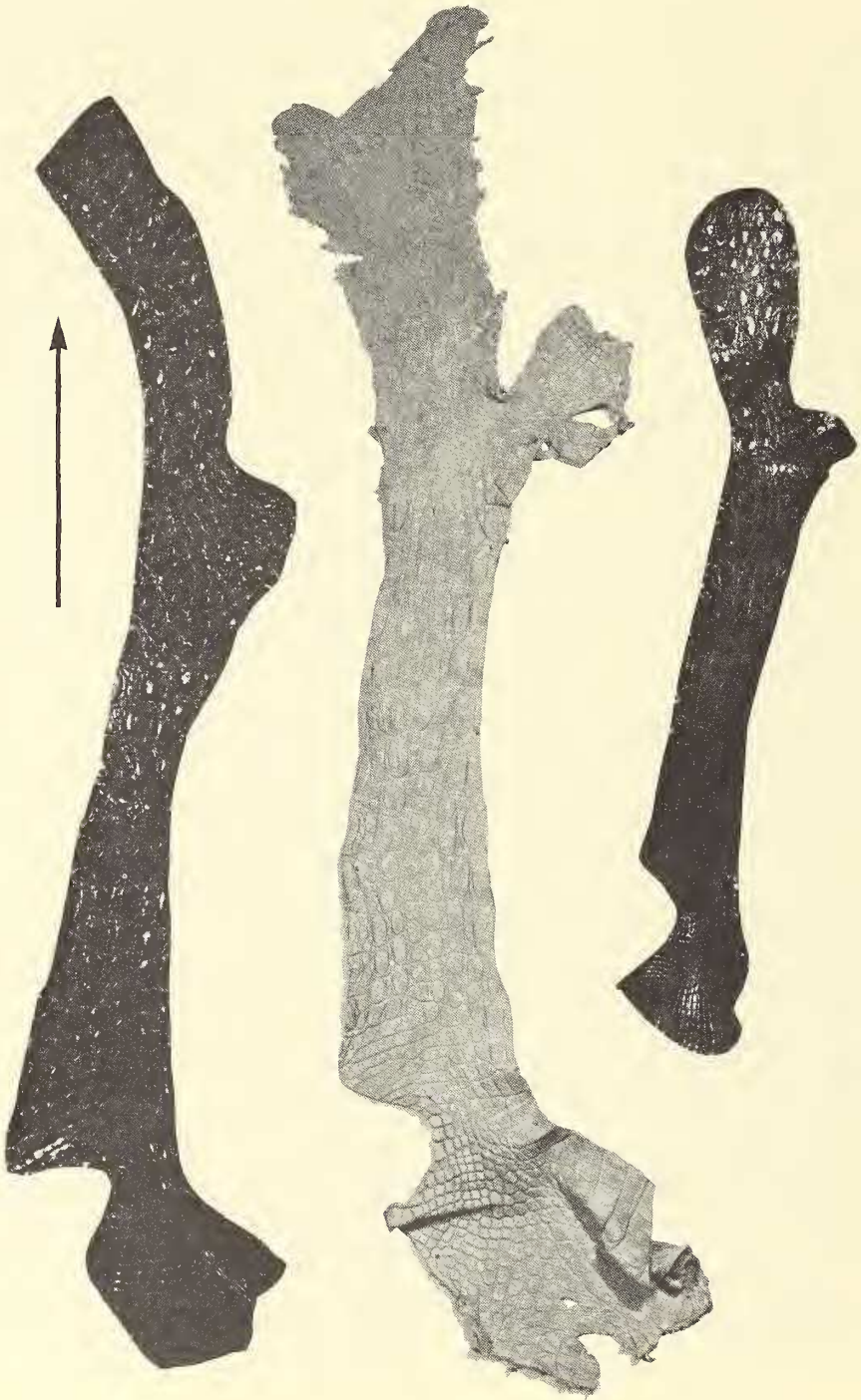


FIGURE 15. Sides of South American caiman (*Caiman crocodilus*). The center hide is a crust. The other two are finished hides. The arrow indicates the anterior (cephalic) end of the hide.

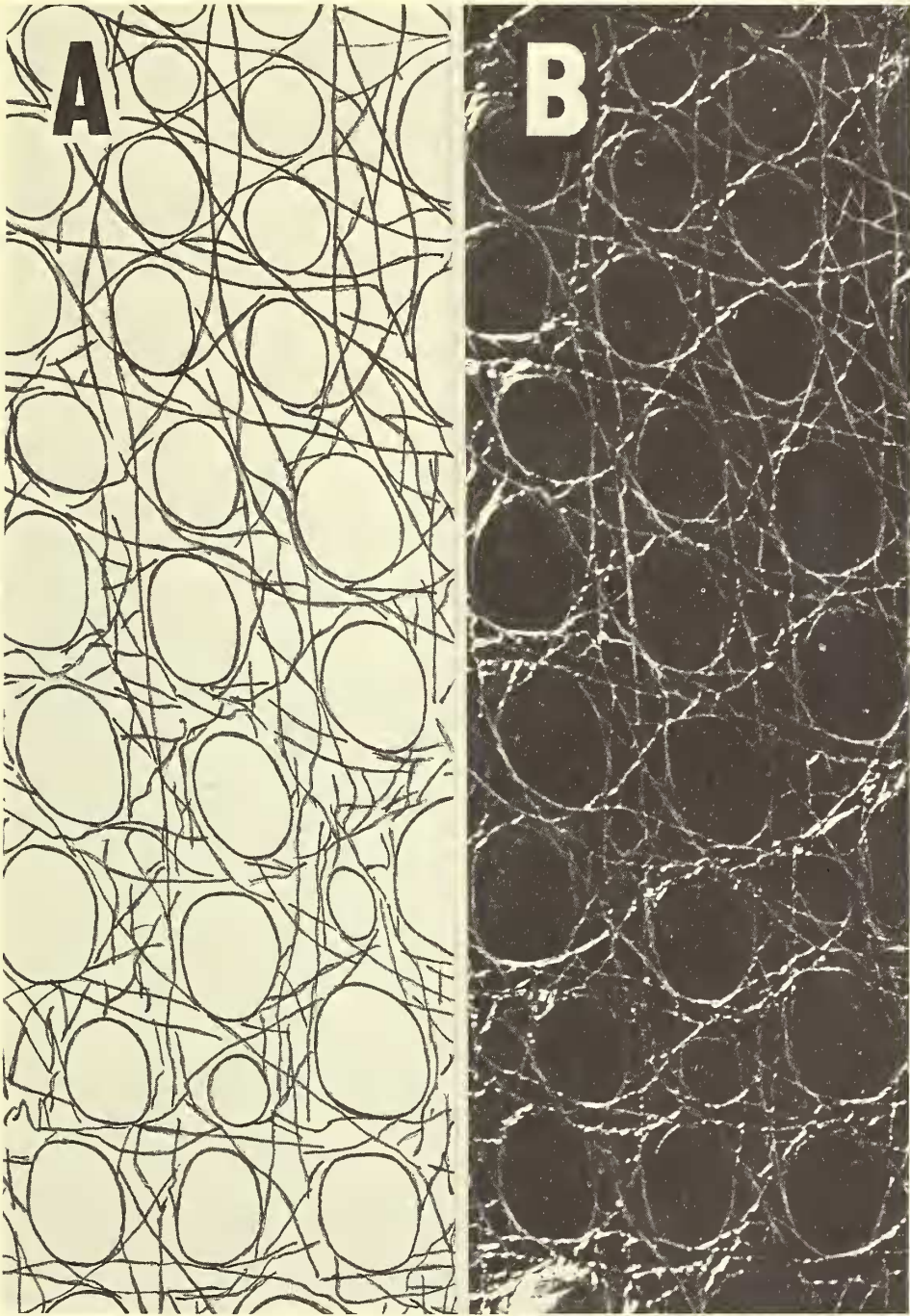


FIGURE 16. Scales of finished South American caiman (*Caiman crocodilus*) sides. A is a diagrammatic illustration of photograph B. Note that the rows of large oval scales alternate with strips of soft skin with a network of creases. Compare this with figure 21.

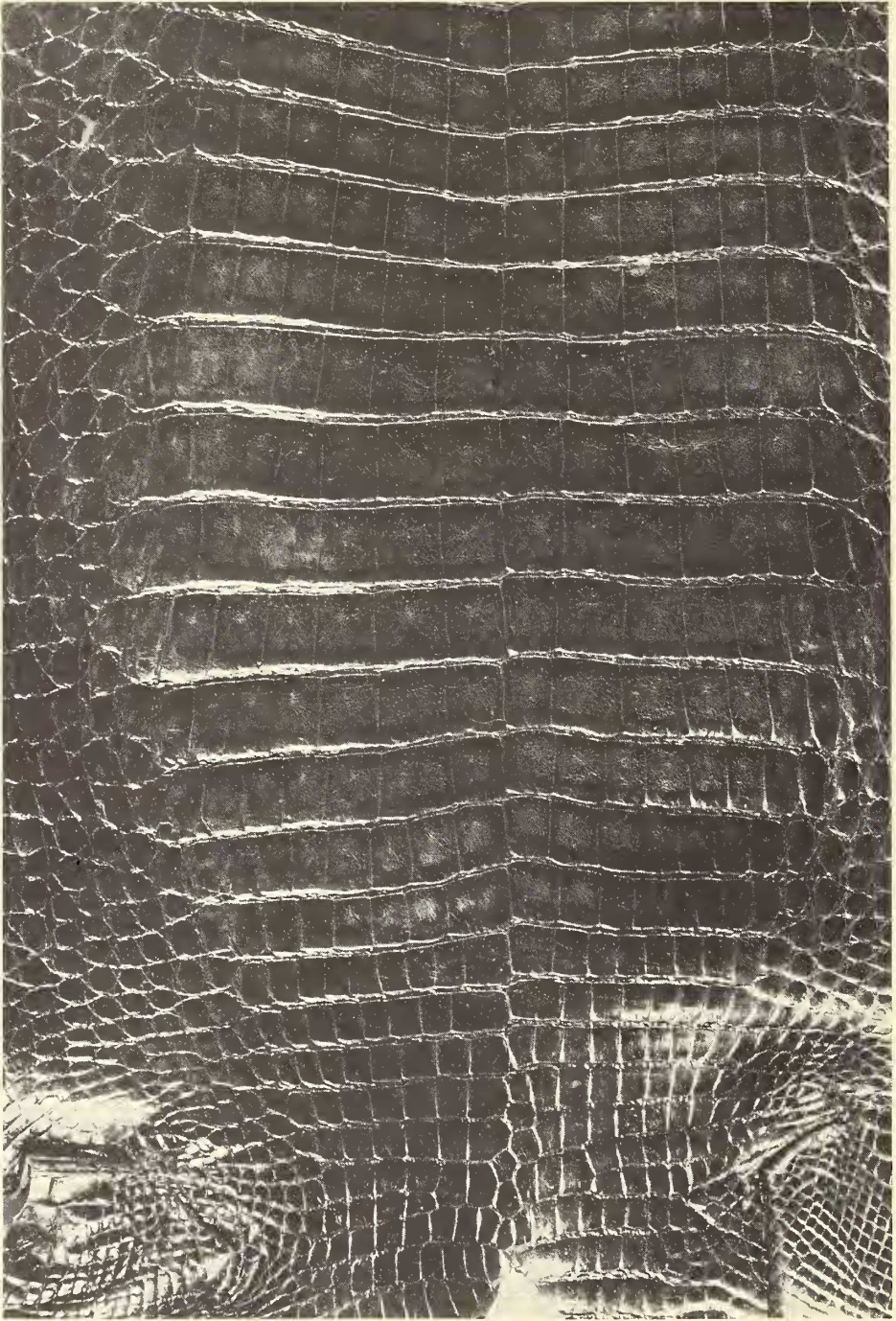


FIGURE 17. Outside surface of a finished black caiman (*Melanosuchus niger*) belly hide. A closer view of the ventral scales is provided in figure 18.

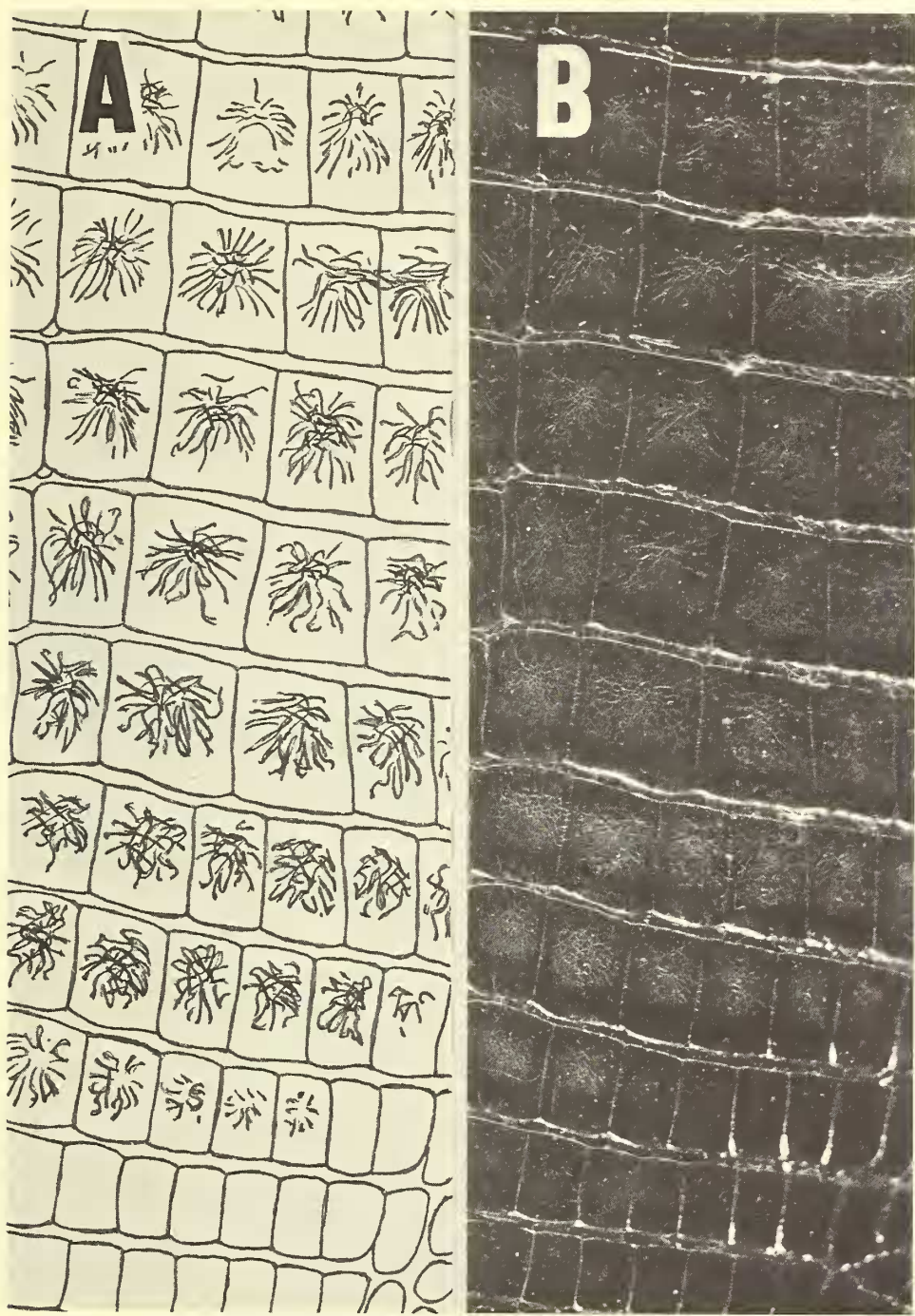


FIGURE 18. Ventral scales of a finished black caiman (*Melanosuchus niger*) belly hide. A is a diagrammatic illustration of the photograph B. Note the wrinkles and fine surface pitting, as well as the lighter color in the centers of the scales. Both conditions are indicative of underlying osteoderm buttons.

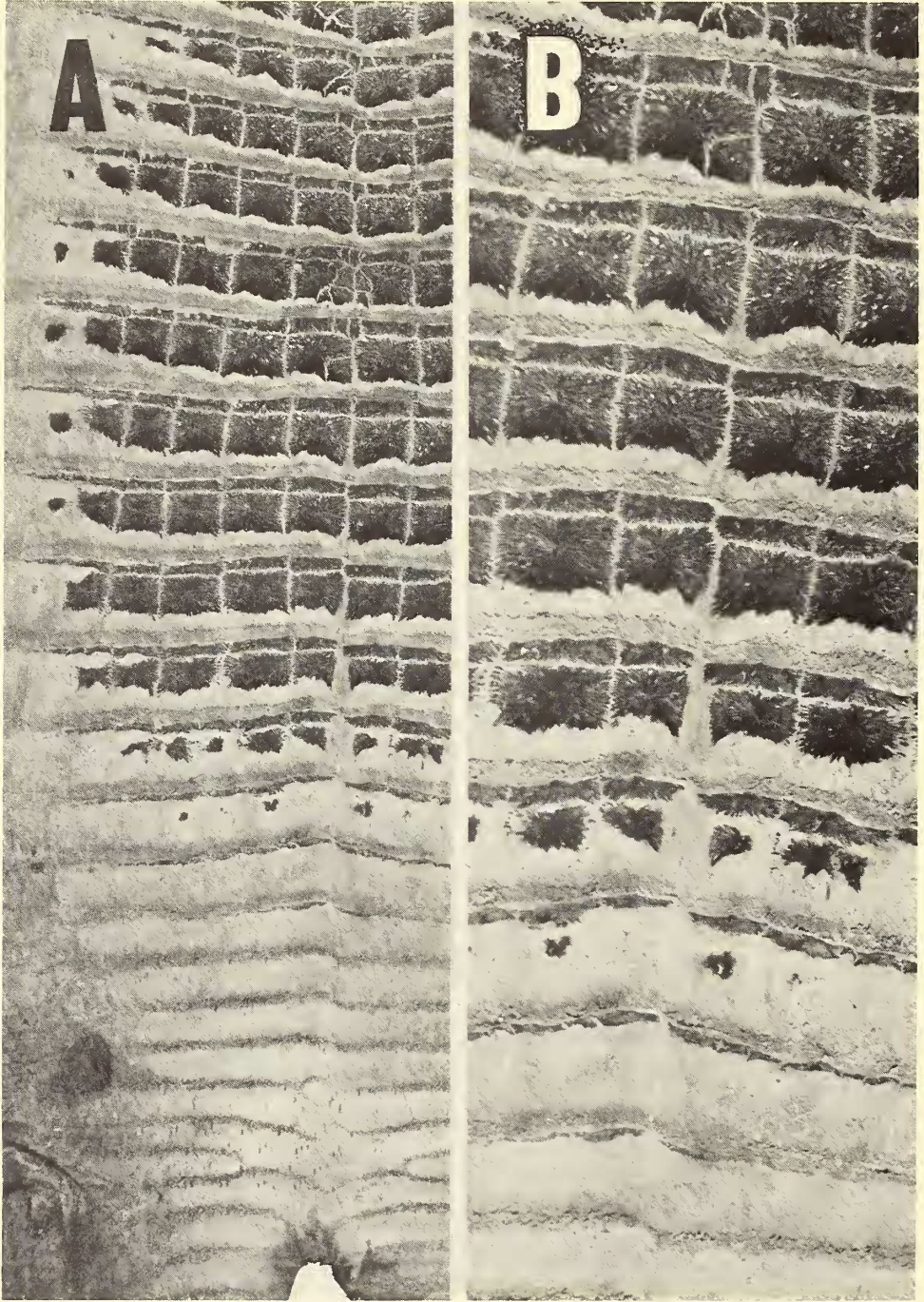


FIGURE 19. Inside surface of a finished black caiman (*Melanosuchus niger*) belly hide. Note the dark double osteoderm buttons in each scale. Photograph B is a close view of the buttons seen in A. This hide has been shaved so most of the anterior button has been removed. Compare it with figures 13 and 14.

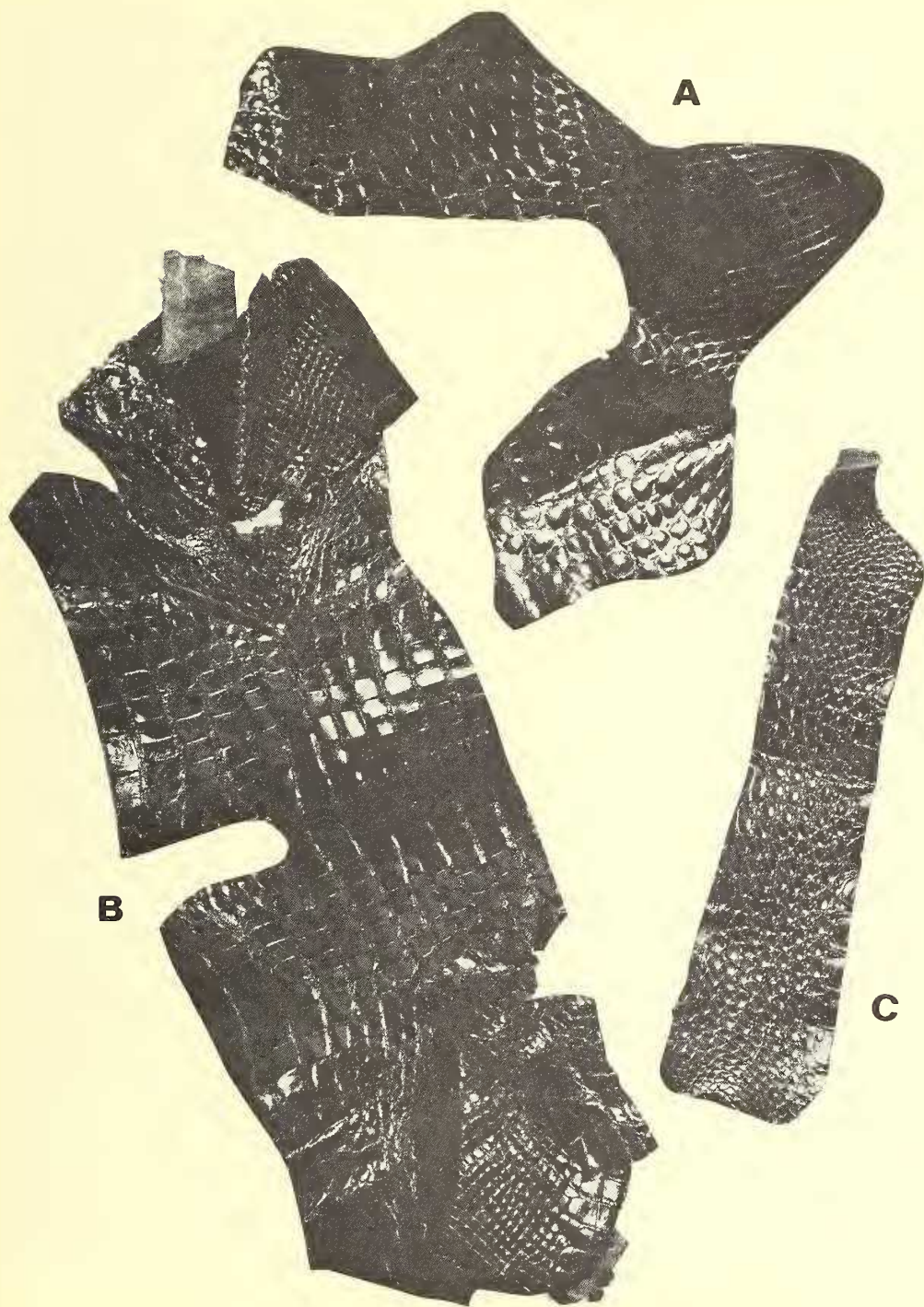


FIGURE 20. Outside surface of finished black caiman (*Melanosuchus niger*) throat (A), girdle (B), and side (C). The scales of the side are shown in figure 21.

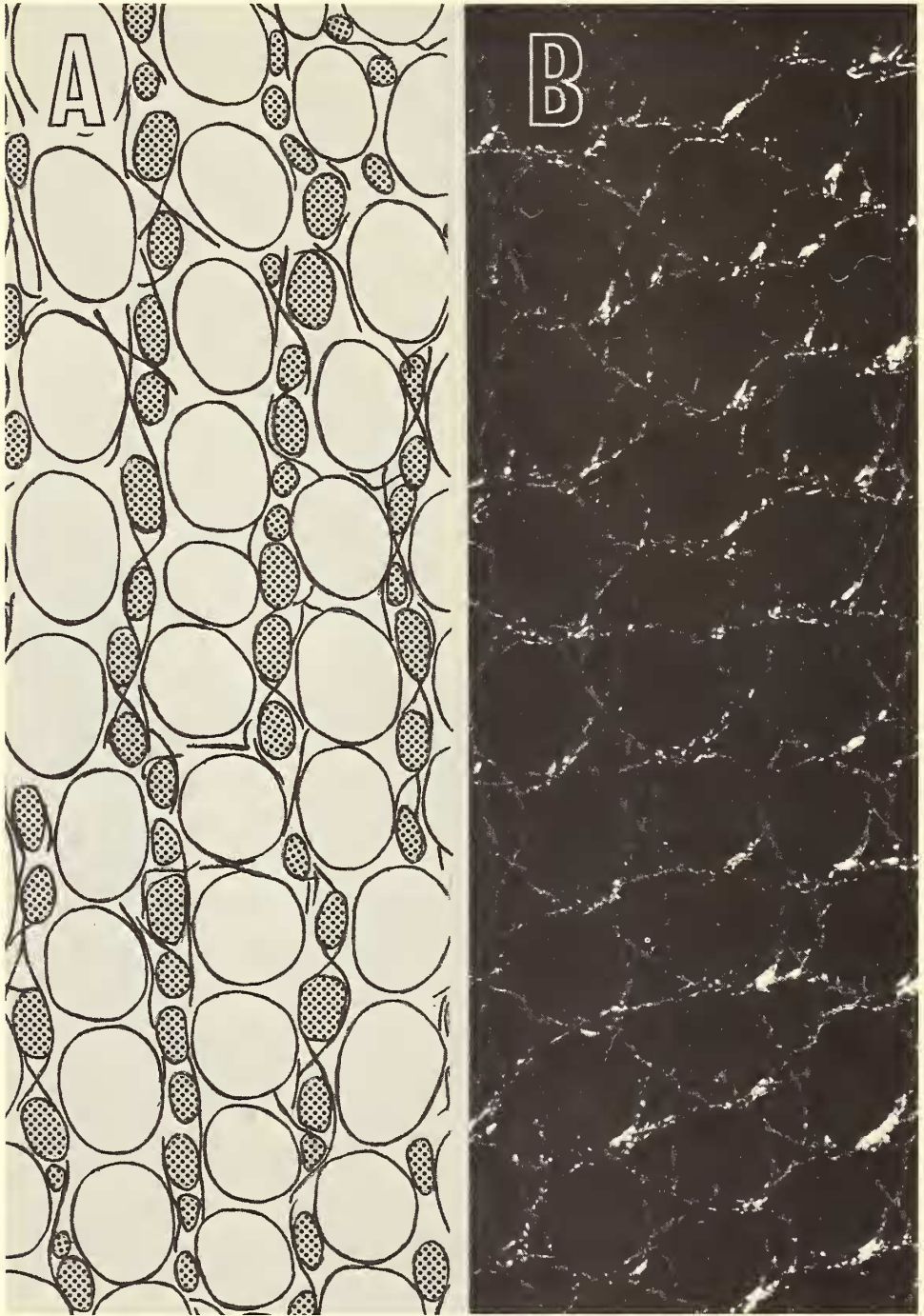


FIGURE 21. Scales of finished black caiman (*Melanosuchus niger*) side. A is a diagrammatic illustration of photograph B. Note that the large oval scales alternate with rows of small scales. Compare this with figure 16.

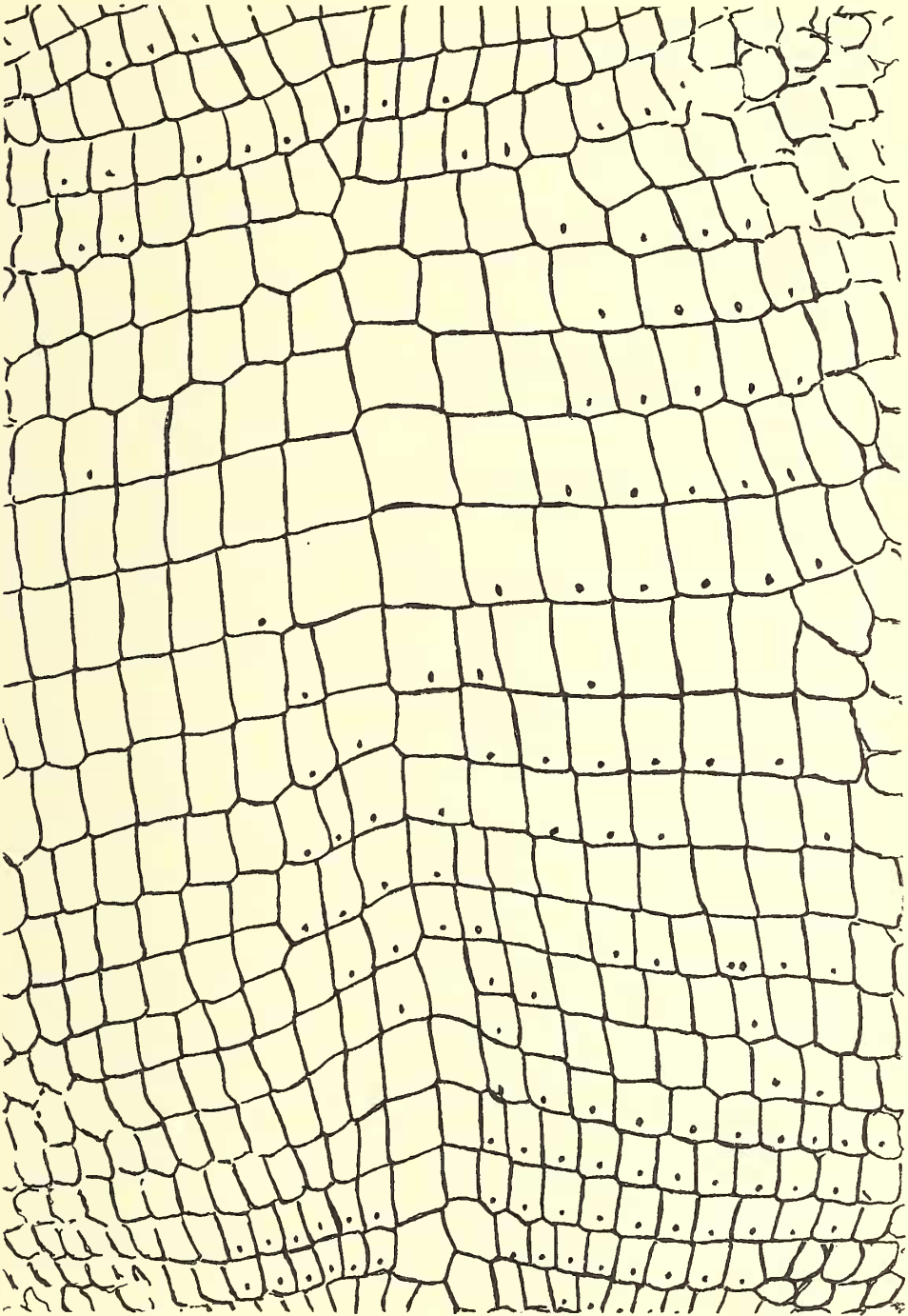


FIGURE 22. Diagrammatic illustration of the Nile crocodile belly hide shown in figure 23. Note the presence of follicle glands (only those visible in figure 23 are illustrated).

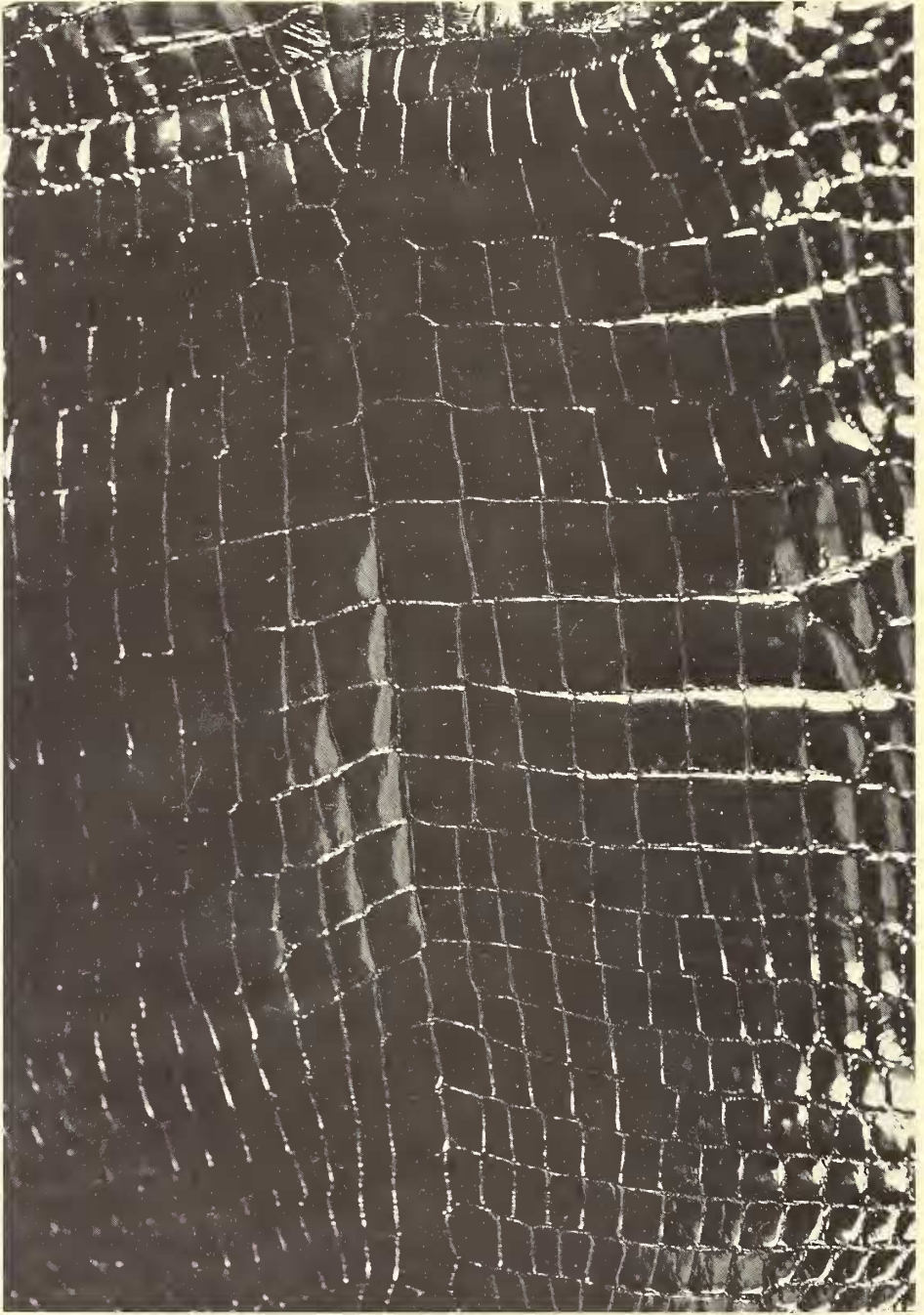


FIGURE 23. Outside surface of a finished Nile crocodile (*Crocodylus niloticus*) belly hide. Compare it with figure 22.

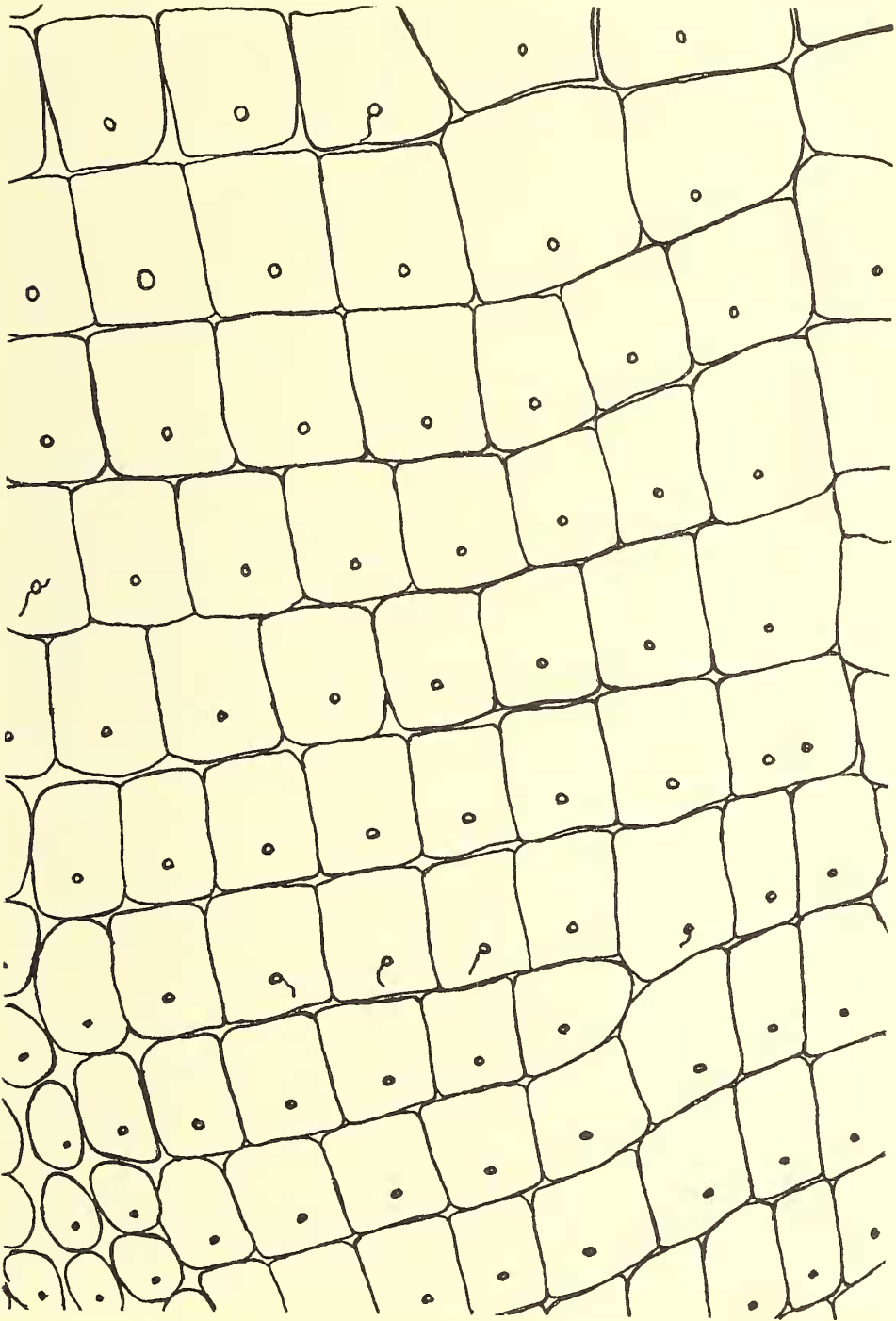


FIGURE 24. Diagrammatic illustration of the ventral scales of the Morelet's crocodile hide shown in figure 25. Note the prominent follicle glands.

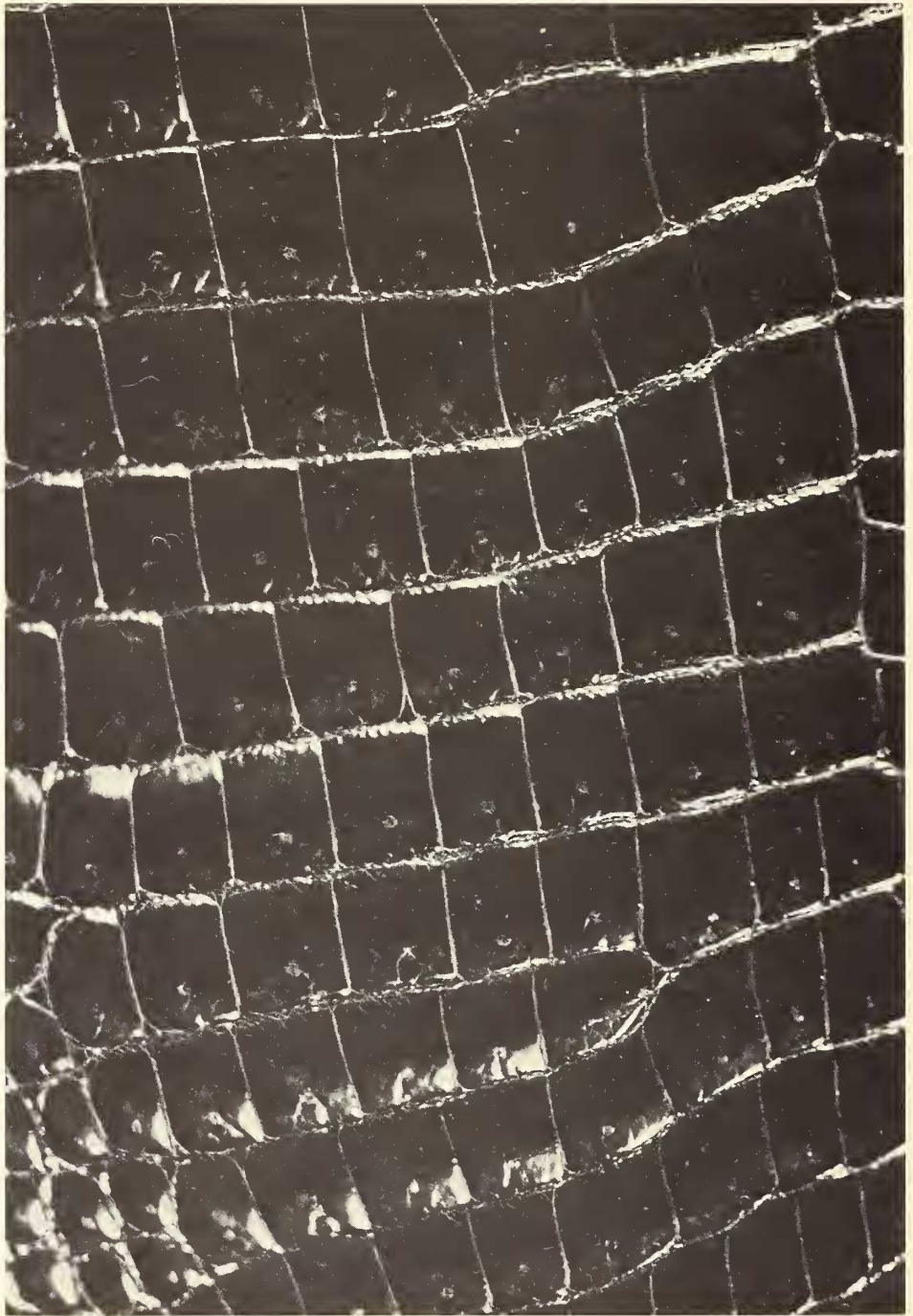


FIGURE 25. Ventral scales of a finished Morelet's crocodile (*Crocodylus moreletii*) belly hide. Compare it with figure 24.

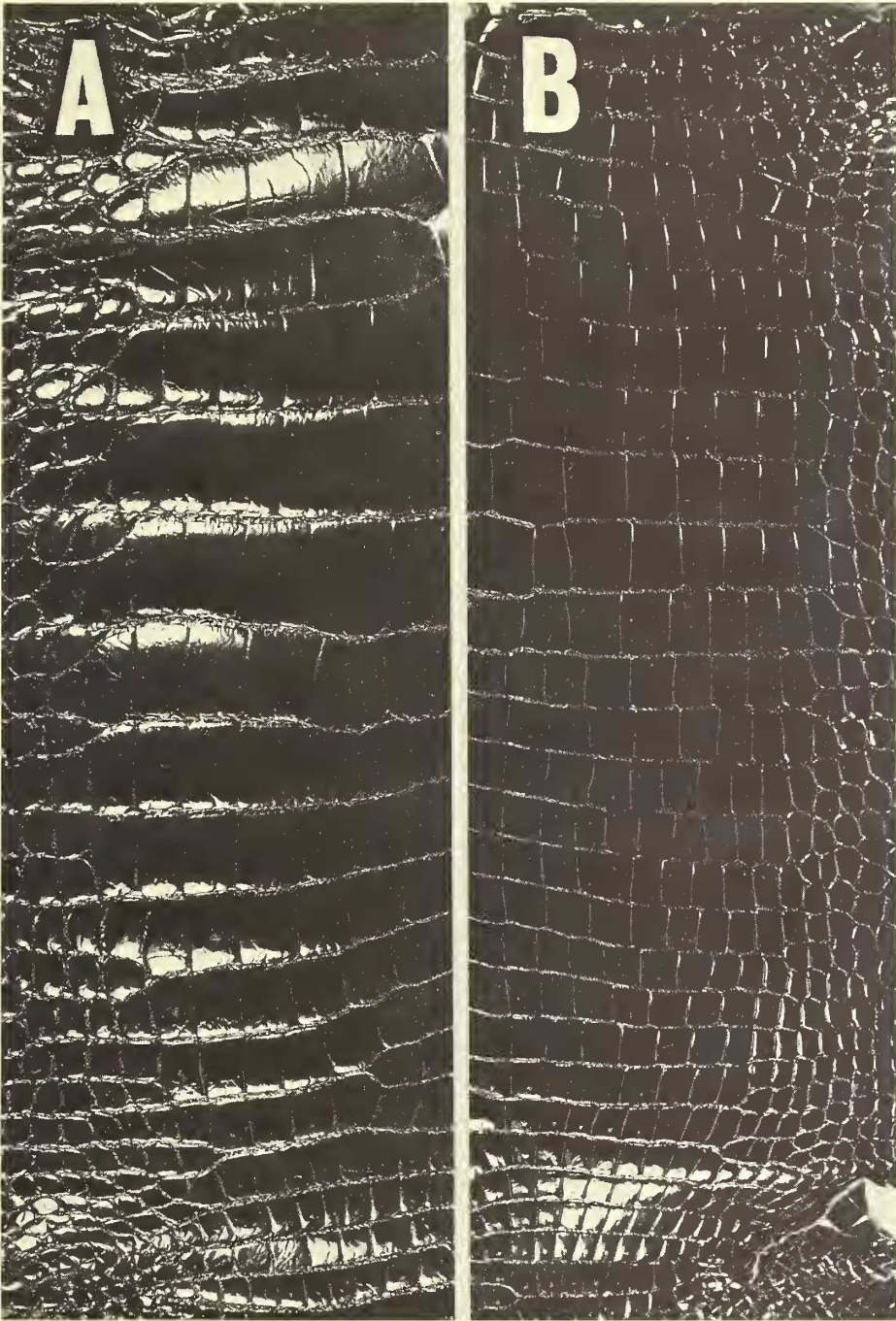


FIGURE 26. Comparison of scale size on (A) large scale false gaviel (*Tomistoma schlegelii*) and (B) small scale saltwater crocodile (*Crocodylus porosus*) belly hides.



FIGURE 27. Inside surface of a finished saltwater crocodile (*Crocodylus porosus*) belly hide. Note the total absence of osteoderm buttons.

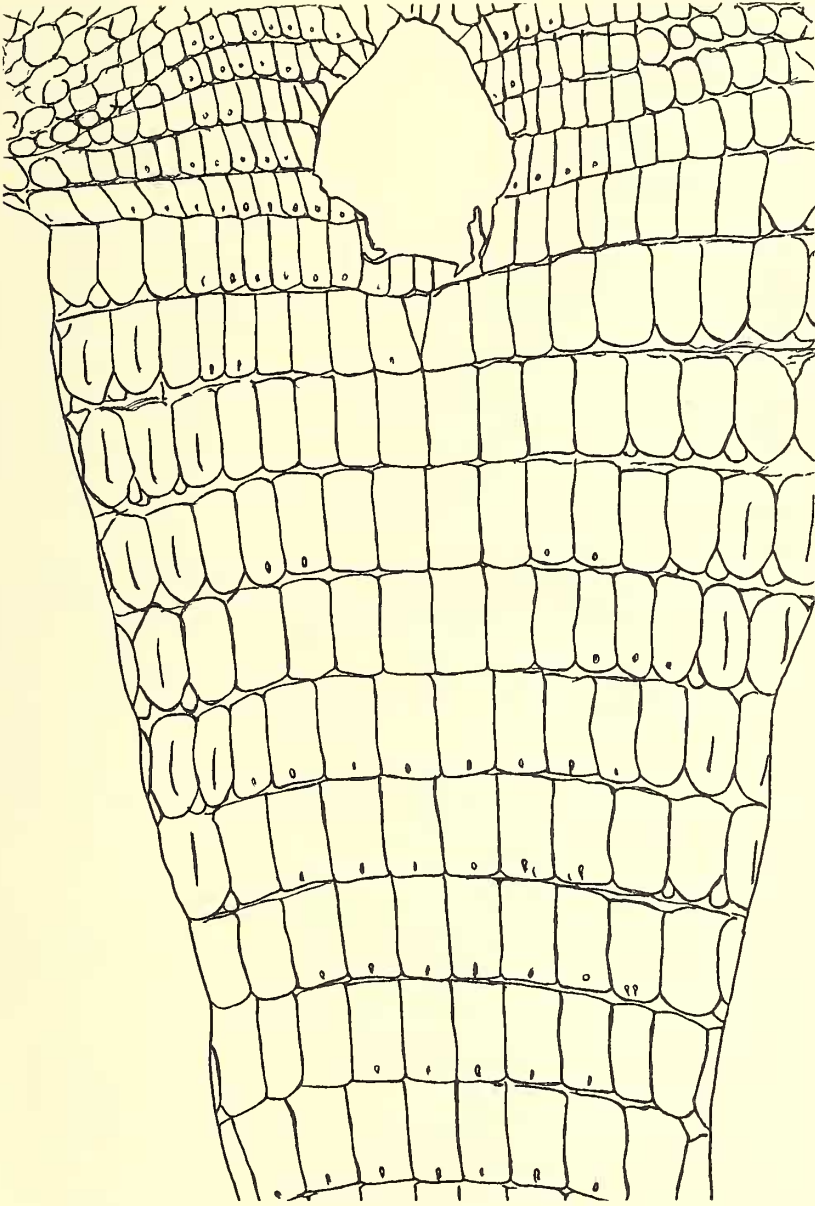


FIGURE 28. Diagrammatic illustration of the Nile crocodile tail whorls shown in figure 29. Note both the presence of follicle glands (only the ones visible in figure 29 are illustrated) and the regular arrangement of the whorls. Compare it with figure 30.

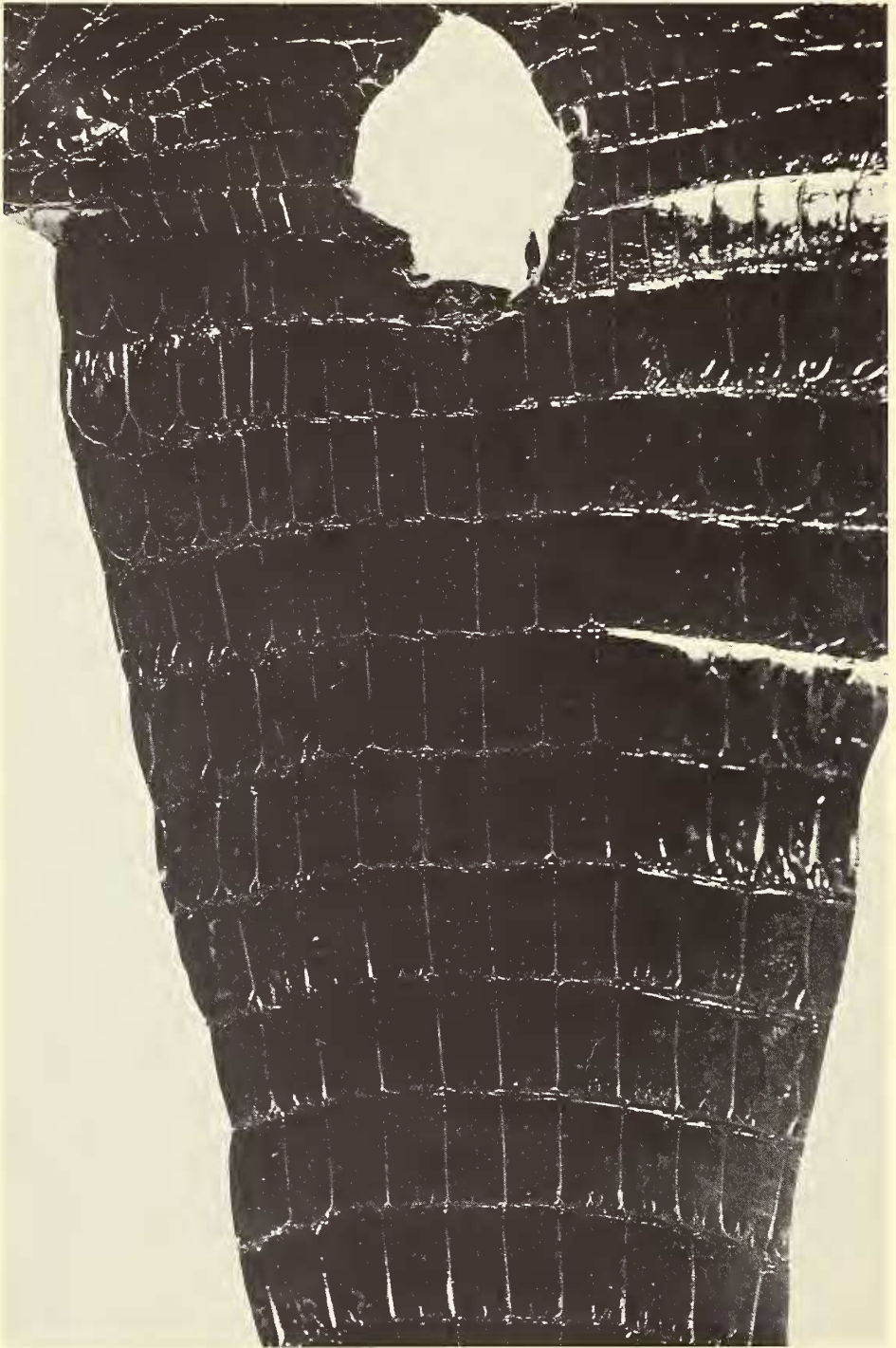


FIGURE 29. Tail whorls of a finished Nile crocodile (*Crocodylus niloticus*) belly hide. Compare it with figure 28.

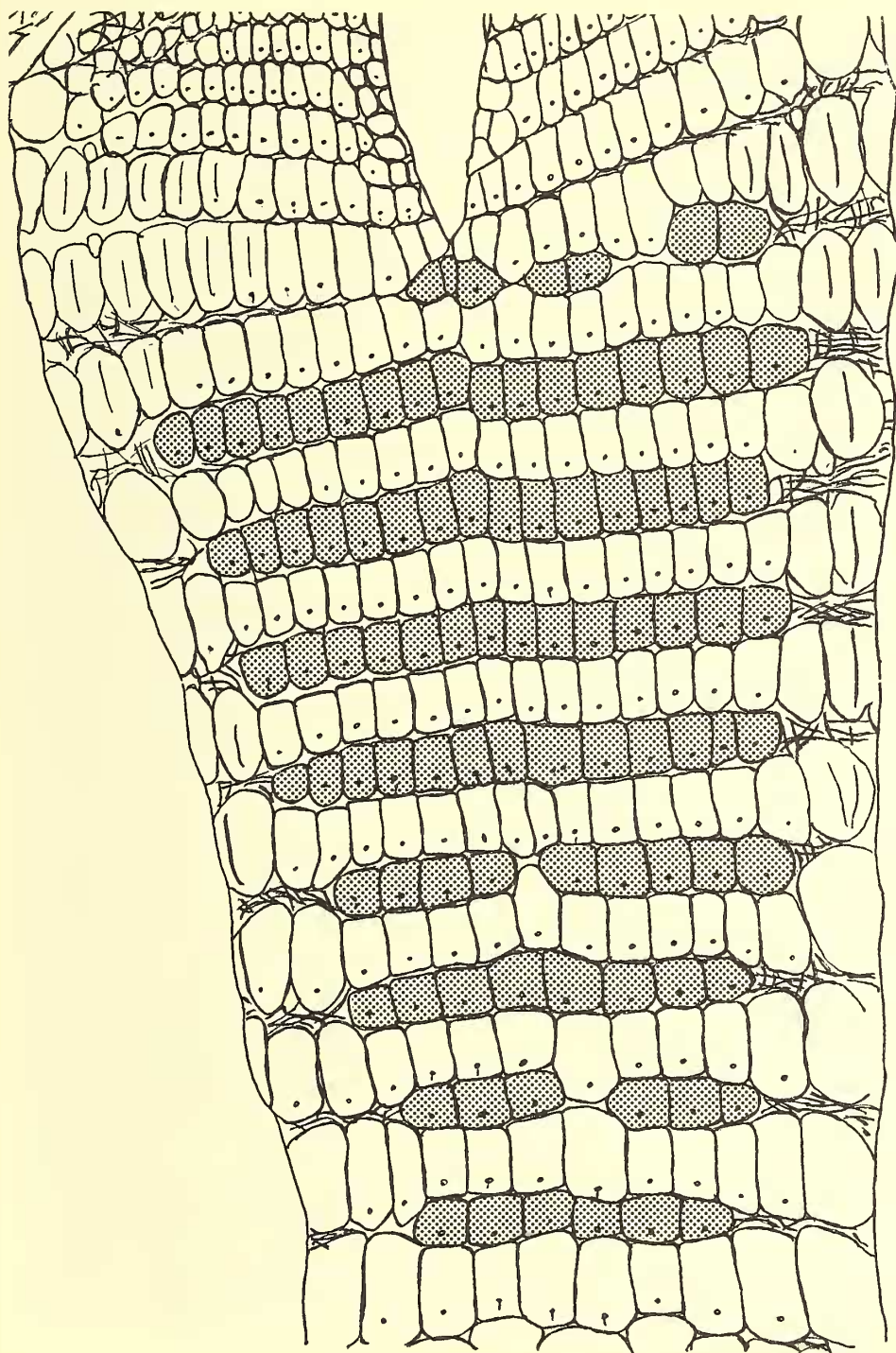


FIGURE 30. Diagrammatic illustration of the Morelet's crocodile tail whorls shown in figure 31. Note the presence of both follicle glands and irregular and incomplete (shaded) whorls. Compare it with figure 28.



FIGURE 31. Tail whorls of a finished Morelet's crocodile (*Crocodylus moreletii*) belly hide. Compare it with figure 30.

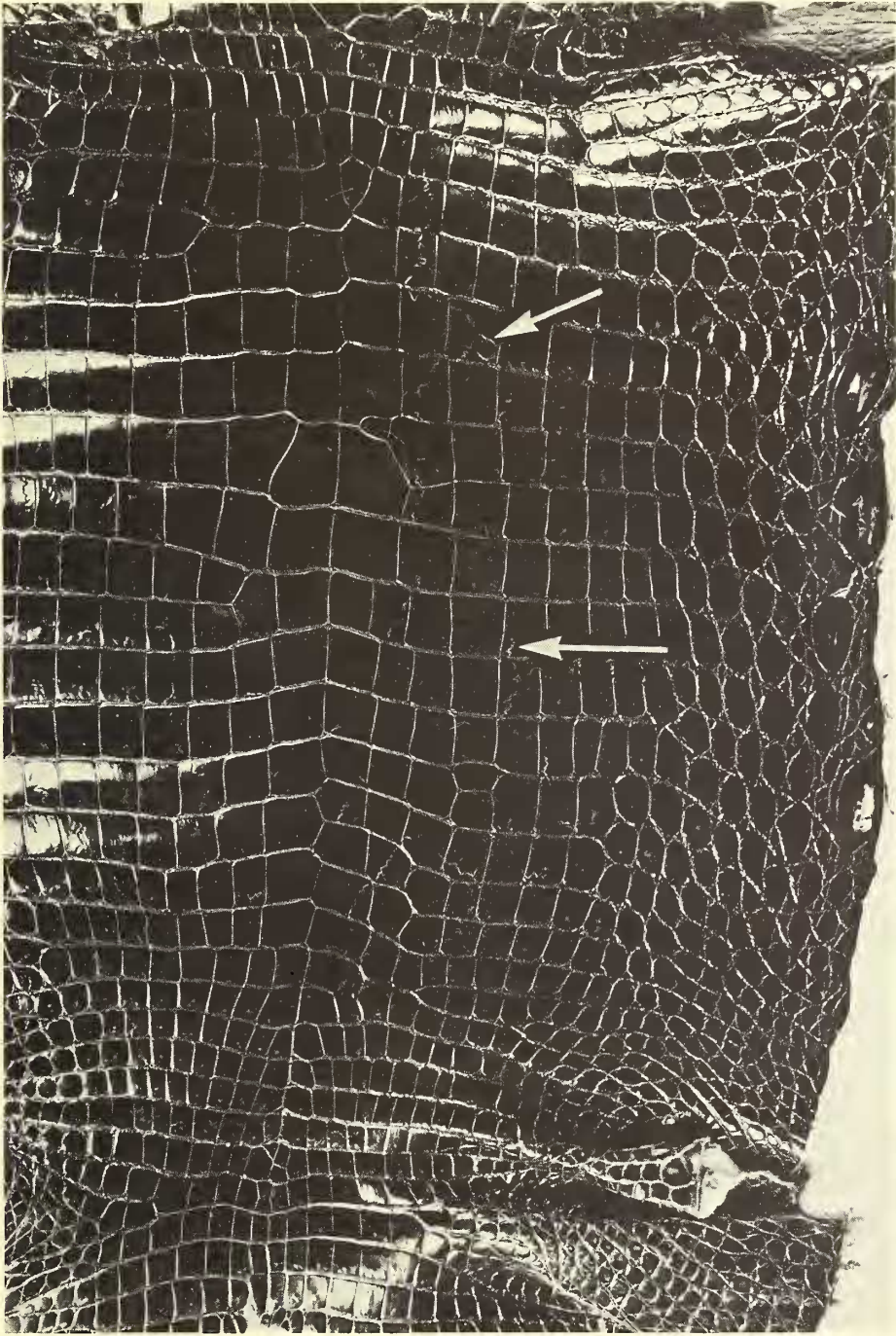


FIGURE 32. Outside surface of a finished Orinoco crocodile (*Crocodylus intermedius*) hide. The arrows indicate the location of parasitic "worm trails." Close views of these trails are shown in figure 33.



FIGURE 33. Undulating "worm trails" on the ventral scales of an Orinoco crocodile (*Crocodylus intermedius*) belly hide. Similar trails have been seen on Johnson's crocodiles (*C. johnsoni*), Morelet's crocodiles (*C. moreletii*), Nile crocodiles (*C. niloticus*), and saltwater crocodiles (*C. porosus*). They probably occur on other species as well.

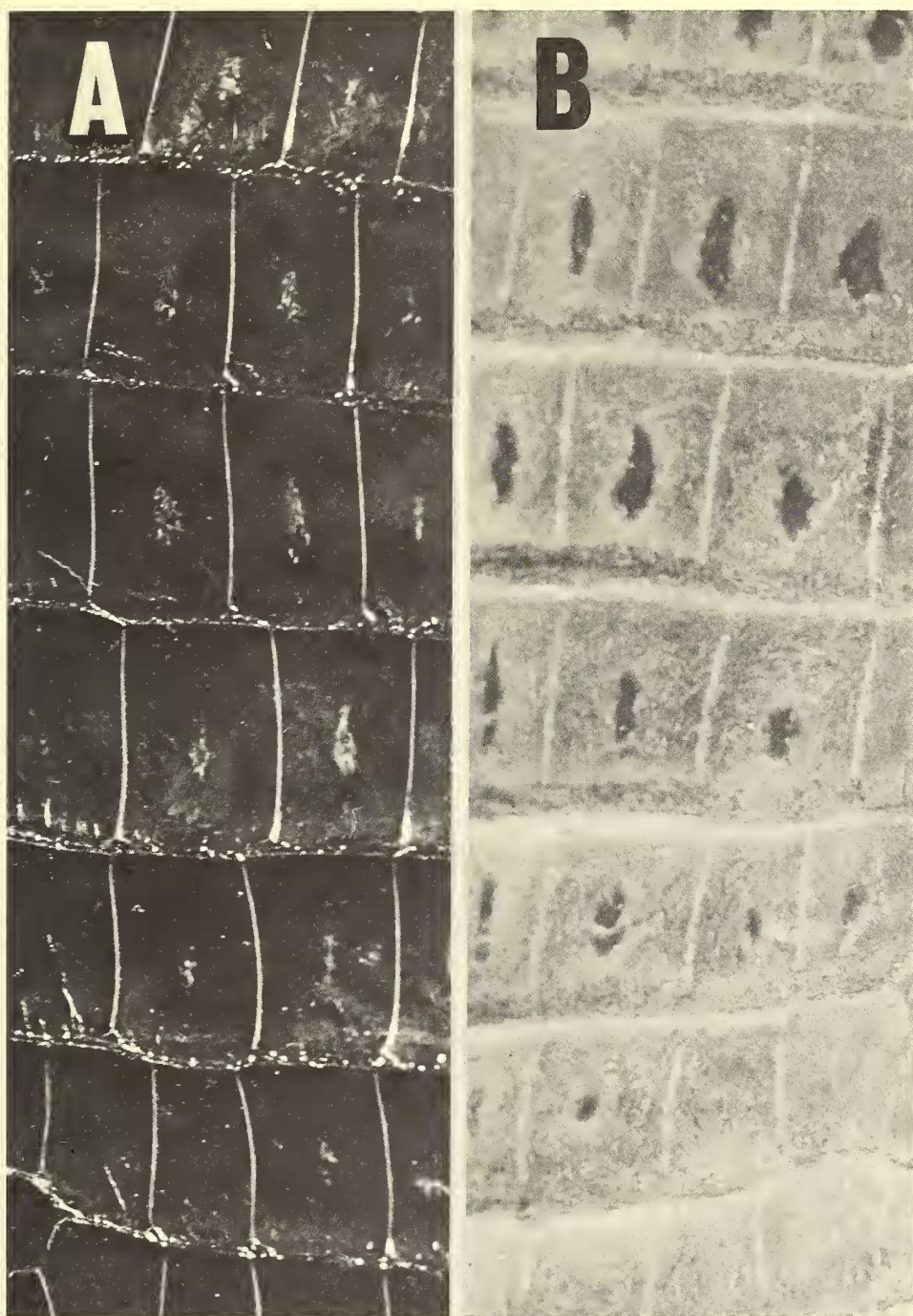


FIGURE 34. Outside (A) and inside (B) surfaces of finished ventral scales of either the African slender-nouted crocodile (*Crocodylus cataphractus*), Nile crocodile (*Crocodylus niloticus*), or dwarf crocodile (*Osteolaemus tetraspis*). Note the lighter color in the center of the scales (A), which are indicative of the underlying dark single osteoderm buttons (B).

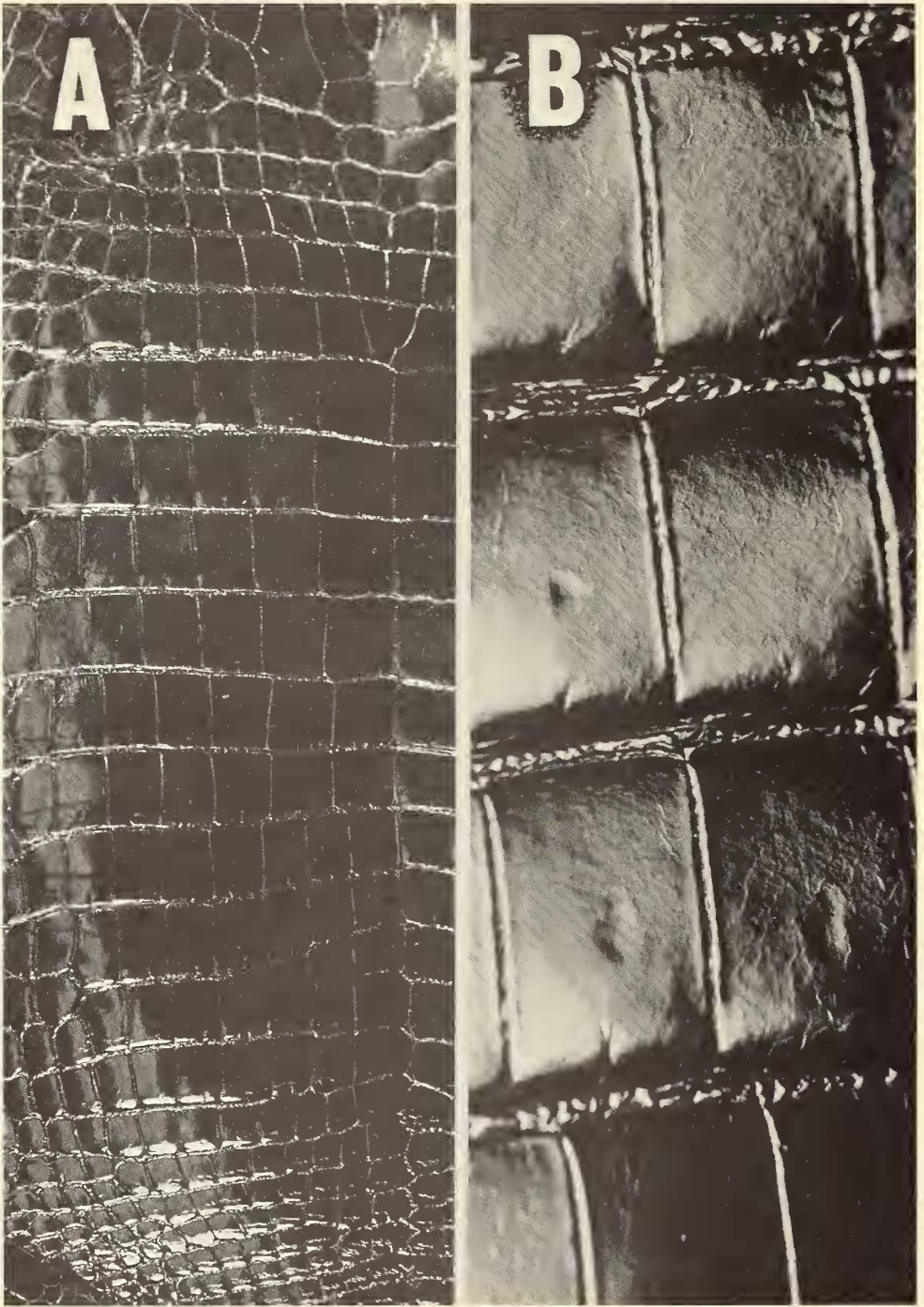


FIGURE 35. Outside surface of a finished belly skin (A) and ventral scales (B) of either an African slender-snouted crocodile (*Crocodylus cataphractus*), Nile crocodile (*Crocodylus niloticus*) or dwarf crocodile (*Osteolaemus tetraspis*). Note the shallow indentations, surface pits, indicative of underlying single buttons. Also note that follicle glands are reduced to deep wrinkles by polishing process.

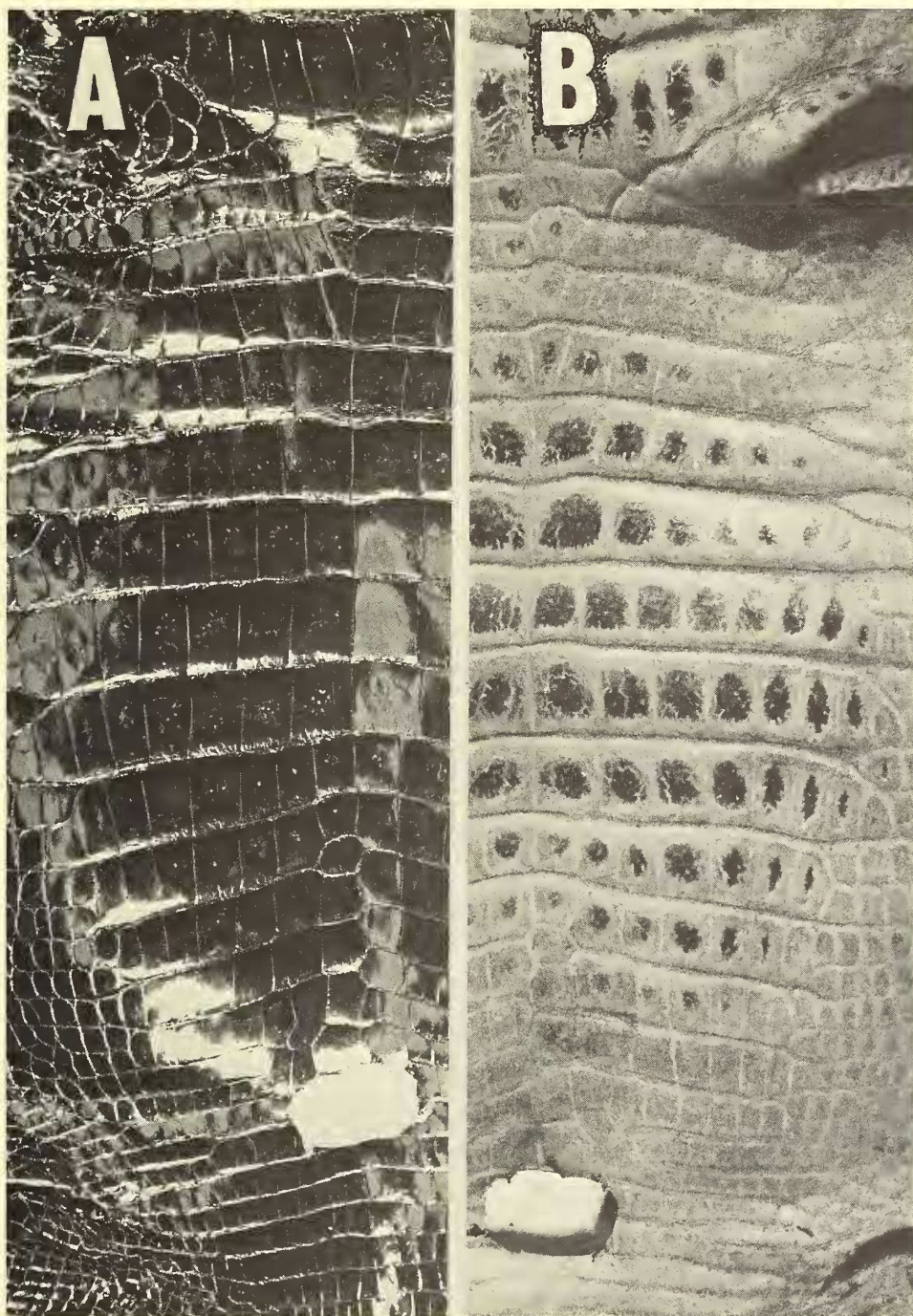


FIGURE 36. Outside (A) and inside (B) surfaces of finished African slender-snouted crocodile (*Crocodylus cataphractus*), Nile crocodile (*Crocodylus niloticus*), or dwarf crocodile (*Osteolaemus tetraspis*) belly hides. Note the surface pitting (A) and dark single osteoderm buttons (B). Close views of the ventral scales are shown in figure 37.

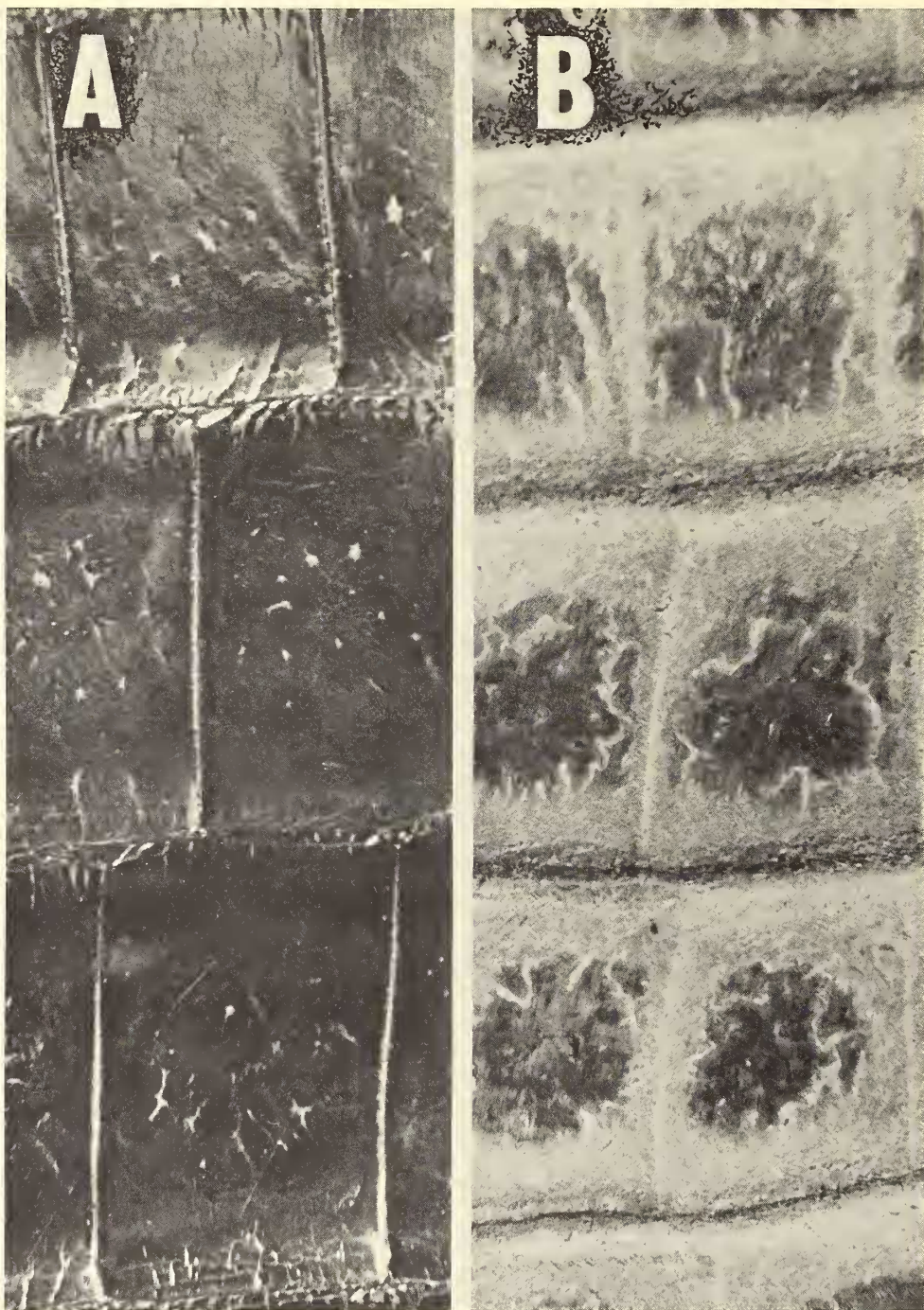


FIGURE 37. Ventral scales (A) and single osteoderm buttons (B) of finished African slender-snouted crocodile (*Crocodylus cataphractus*), Nile crocodile (*Crocodylus niloticus*), or dwarf crocodile (*Osteolaemus tetraspis*) hides. Because of the technique used to dye this hide, the surface pitting is white against the dark scales.



FIGURE 38. Lady's purse made from narrow South American caiman (*Caiman crocodilus*) sides. Seams where the sides are glued together are difficult to locate. Arrows indicate seams.

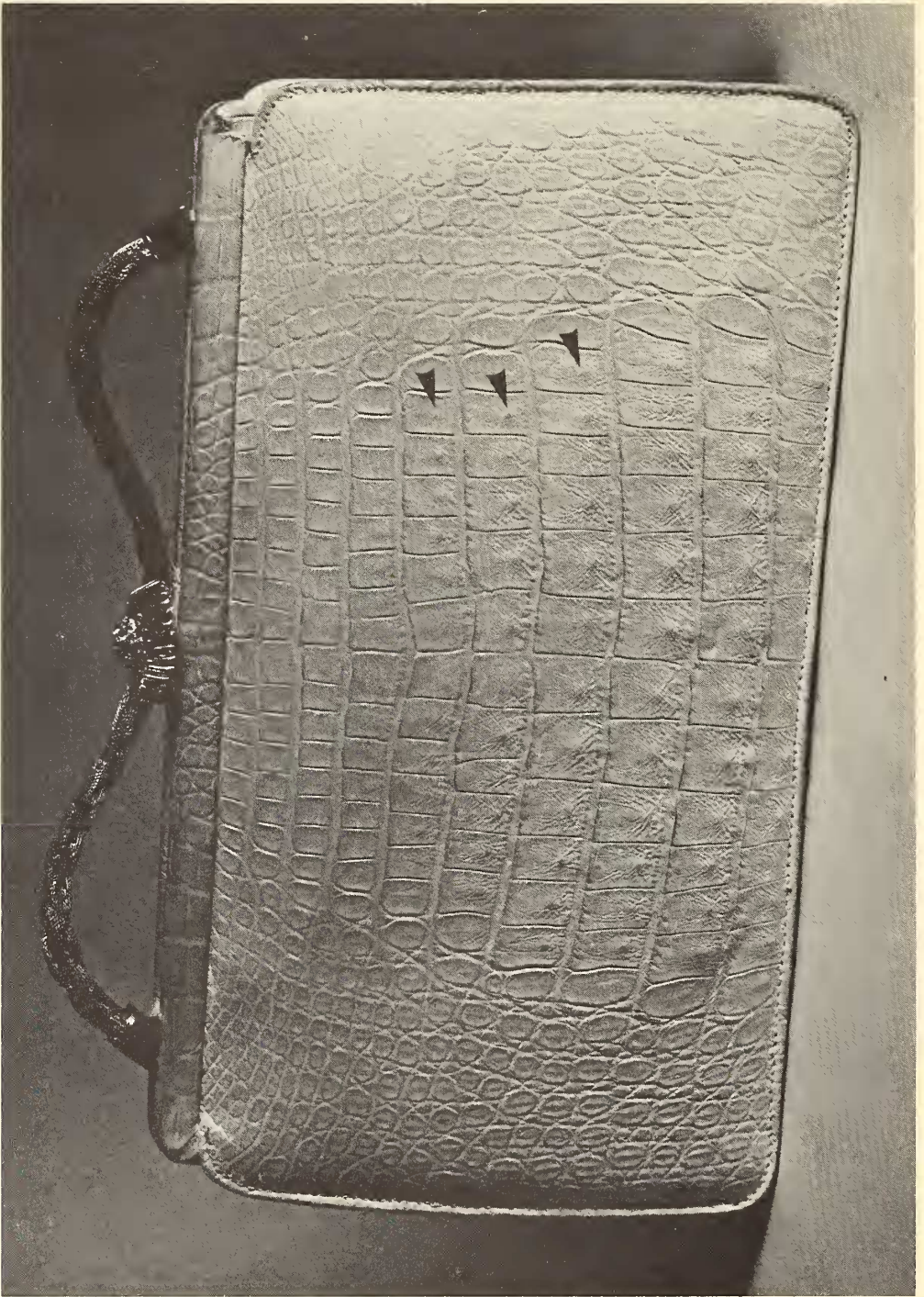


FIGURE 39. Lady's purse made from a South American caiman (*Caiman crocodilus*) belly. Note the wrinkles and surface pitting. Arrows indicate the high points of the scales. In this species the high point is just anterior to the center of the scale (the anterior end of this hide is touching the table, the posterior end is up).

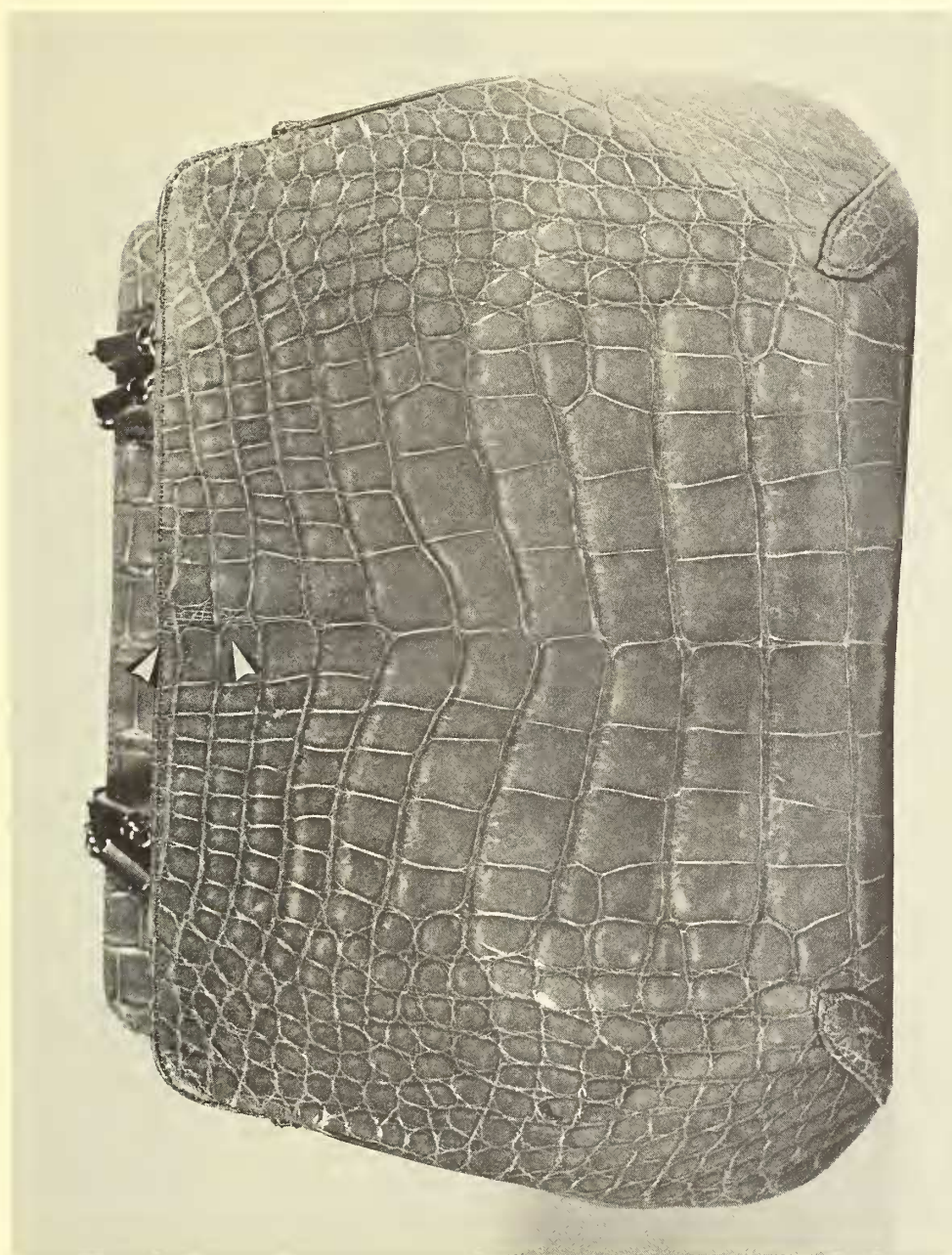


FIGURE 40. Lady's purse made from American alligator (*Alligator mississippiensis*) belly. Note the absence of both surface pitting and follicle glands. Also note the spider-web umbilicus indicated by the arrows.

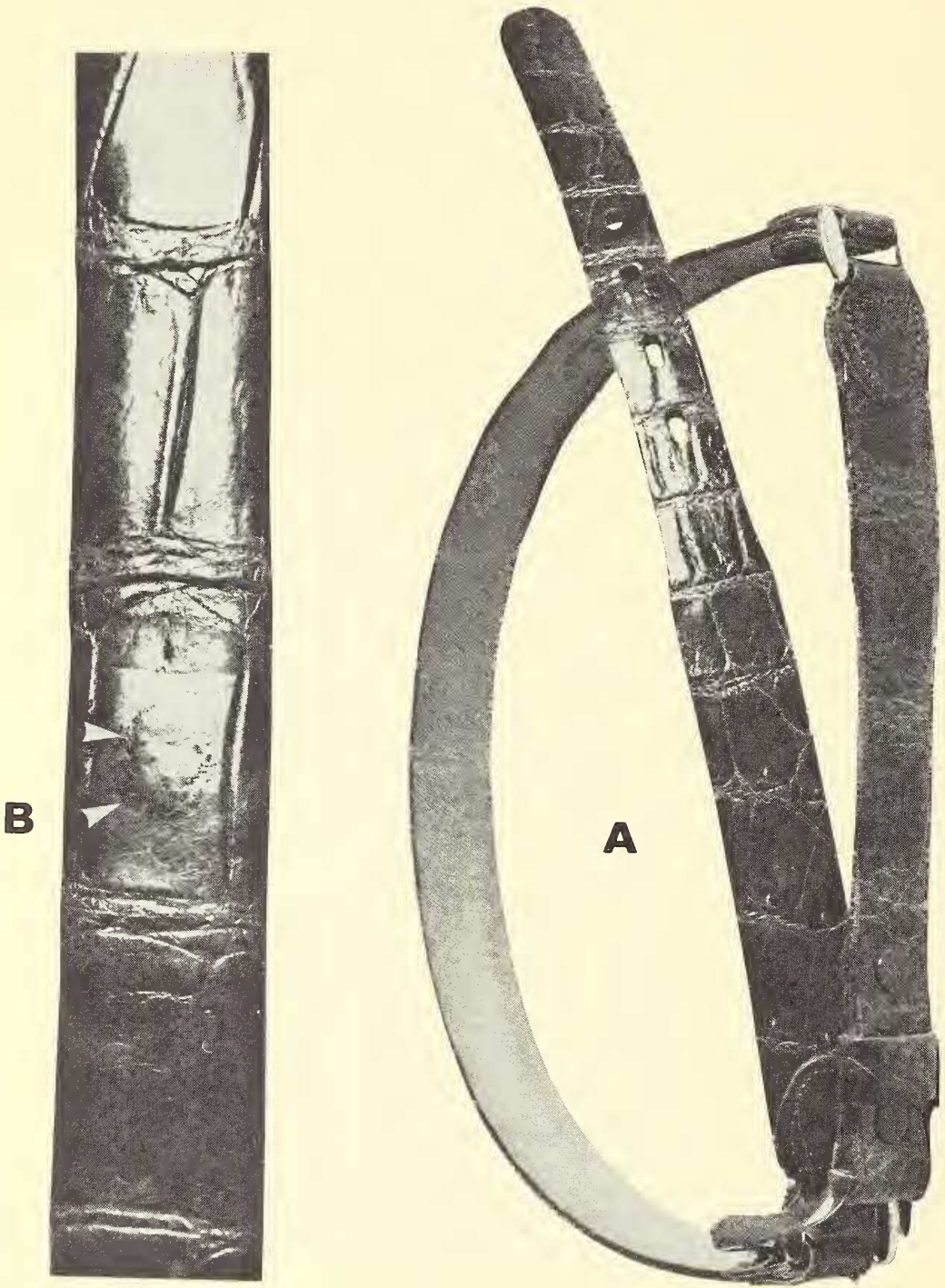


FIGURE 41. Man's belt made from either African slender-snouted crocodile (*Crocodylus cataphractus*), Nile crocodile (*Crocodylus niloticus*), or dwarf crocodile (*Osteolaemus tetraspis*) belly hide. Photograph B is a close view of some scales from A. Note follicle glands and also slight hump (arrows) indicating underlying single osteoderm buttons.